United in Death:

The Pre-Burial Origins of

Anglo-Saxon Cremation Urns

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Abstract

This thesis represents a major re-evaluation of pottery from early Anglo-Saxon (c. AD 425-625) England, examining the pre-burial origins of cremation urns through a variety of methods. It takes a use-alteration approach to the study of urns from two cemeteries, Elsham and Cleatham (North Lincolnshire), and the pottery recovered from 80 non-funerary find-sites that surround them, in order to determine a pre-burial biography for each individual urn. This reveals that the majority of urns were involved in production and consumption activities prior to their use as containers for the dead, whilst ethnographic comparisons indicate that the brewing of beer may have been their primary use in the domestic sphere. It is argued that this pre-burial use was an extremely significant concern in the selection of appropriate vessels for burial.

The forms of cremation urns are then considered in light of their functional properties, and each form is placed in the context of pre-burial use. Meanwhile, analysis of the decoration of both the funerary and non-funerary pottery demonstrates that urn decoration was directly linked to pre-burial function, and that individuals may have been buried in plots relating to community, kin or household groups. These results are complemented by an analysis of ceramic fabrics, revealing that ceramic paste recipes were dictated by cultural, rather than geological, constraints. The distribution of these fabrics further supports the notion that the dead were buried in community or household areas. Finally, through detailed petrographic analysis of ceramic fabrics from the cemeteries and non-funerary sites, the geographical origins of vessels are identified, and the catchment areas of these large cremation cemeteries are revealed.

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Chapter 1
Introduction

Introduction

It was once thought that clear geographical and cultural distinctions existed between those communities of early Anglo-Saxon England (c.AD 425-625) who cremated their dead and those who practiced inhumation. These burial rites were believed to define social groups and express cultural affiliation, while their distribution throughout parts of southern and eastern England was seen as a fossil record of the progress of invading Germanic tribes (as summarised in Williams 2002a). In 1964, for example, Audrey Meaney (1964, 15) reported that there is 'some truth in the old dictum that Angles cremated' whist the 'Saxons and Jutes inhumed'. When instances of cremation were found in Saxon and Jutish areas, Meaney interpreted them as the 'very earliest' burials, whereas inhumations found in Anglian areas were considered to be later. It is now recognised, however, that although a single rite may dominate in a particular region, or individual cemetery, neither rite was practiced in isolation and that cremation and inhumation often occurred side by side (Williams 2002a, 60). The (predominantly) cremation cemetery at Spong Hill (Norfolk), for example, contains 57 inhumations alongside its c.2700 cremations (Hills *et al.* 1994, 47-55). As fourteen of these inhumations are cut by cremation burials, this clearly demonstrates that they were earlier than the cremations and not later, as would have been predicted by Meaney (Hills *et al.* 1984, 11).

One observation which still holds true is that it is in eastern England that we find the largest cremation cemeteries[1], for example, Spong Hill, in Norfolk, and Loveden Hill (c.1700 cremations), Cleatham (1204), and Elsham, (625) in Lincolnshire (Leahy 2007b, 38). Despite their magnitude, these cemeteries were in use for a relatively short period of time (c.200 years) and when one considers that the largest fully excavated inhumation cemeteries rarely exceed c.300 burials, including those used throughout the 'pagan period' (fifth and sixth centuries) up to the seventh century, it would appear that the large cremation cemeteries signify a special form of mortuary organisation. Some scholars have even suggested that they represent centralised crematoria for discrete 'territories' (Leahy 1993, 36; see also Faull 1976, 231; Williams 2002b, 344-5; 2004a, 114; Williamson 1993, 68).

[1] For ease the terms 'cremation' and 'inhumation cemetery' are henceforth used to describe a cemetery's dominant rite.

Three of the four largest early Anglo-Saxon cremation cemeteries – Loveden Hill, Cleatham and Elsham – are found in the historic county of Lincolnshire (as defined by Bennett and Bennett (1993)) (Figure 1.1). It is unfortunate, therefore, that despite all being extensively excavated, only one of these cemeteries, Cleatham (Leahy 2007a), has ever been published. Although the grave goods, urn decoration and the growth and development of this cemetery have been well studied, no detailed analysis of the ceramic fabrics was undertaken, nor was there an analysis of the cremated human remains (although these have recently been the subject of a doctoral thesis (Squires 2012)). It is the express aim of this thesis, therefore, to systematically analyse for the first time the ceramic urns from the unpublished site of Elsham alongside a full ceramic assessment of the Cleatham urns.

Figure 1.1: The cremation cemeteries of Lincolnshire (adapted from Leahy 2007a, Figure.5).

The avenues of enquiry to be followed in this thesis depart from the modes of analysis frequently applied to cremation cemeteries and their urns. That is to say, this thesis does not concern itself with drawing detailed parallels between the decoration on urns from one cemetery with those from another, nor are there any discussions on the possible continental ancestry of the persons whose bones are buried in the pots under study (see for example Fennel 1964; Leahy 2007a; Lethbridge 1951; Myres 1969; 1977; Myres and Green 1973; Webster and Myres 1951). Rather, this study uses the pottery from the cemeteries of Elsham and Cleatham, as well as 2295 sherds (weighing 21.339kg and representing the remains of 2205 vessels) from 80 early Anglo-Saxon pottery find-sites that surround these cemeteries (see below), to investigate three broad, inter-related themes. The first theme to be addressed is whether cremation urns were made specifically for the funeral. If not, then what were they used for before being buried, how do their forms relate to their pre-burial functions and why were they subsequently considered special enough to hold the remains of the dead? Secondly, by analysing and plotting the distributions of types of decoration employed on cremation urns, and the ceramic fabrics from which they were made, this study seeks to gain a greater understanding about how burial was organised in cemeteries. Finally, by comparing the pottery found at cremation cemeteries with that found at non-funerary sites this thesis aims to provide a greater understanding of the modes of production of early Anglo-Saxon pottery, the 'catchment areas' that these cremation cemeteries served, and the level of exchange of pottery in early Anglo-Saxon North Lincolnshire. This chapter provides background to the questions being posed here (more detailed discussion is provided in subsequent chapters), before moving on to present an overview of the sites that will be used to answer these questions.

The Origins of Cremation Urns

The origin of elaborately decorated cremation urns is a subject that has long been debated. Most authors believe, as David Wilson (1965, 98) claimed, that urns were 'specially made to contain the remains of the dead' (for example, Laing and Laing 1979, 77; Leahy 2007b, 54; Richards 1987, 206-7). Such views stem from the relative proportions of decorated pottery found in funerary and domestic contexts, observable correlations between the decoration and aspects of identity of the cremated remains, and the apparent lack of evidence for pre-burial domestic use (Leahy 2007b, 55). Indeed, decorated pottery generally constitutes only c.5% of pottery assemblages from settlements (Blinkhorn 1997, 117), whilst, in contrast, the proportion of decorated urns in cremation cemeteries may be as high as 80% (Richards 1987). Urns which show clear signs of domestic use are also apparently in the minority. Leahy identified sooting deposits on just 35 of 1204 urns from Cleatham , whilst only sixteen of the 463 urns from Mucking (Essex) bore sooting deposits; in both instances this is just 3% of the respective assemblages (Leahy 2007a, 86; Mainman 2009, 603). Furthermore, the majority of sooted urns from Mucking were undecorated, while at Cleatham Leahy records that only two sooted urns bore decoration (Hirst and Clark 2009, 603; Leahy 2007a, 86).

A comparison of vessel form and specific decorative schemes with the age, gender and social status of the vessel's inhabitants, undertaken by Julian Richards (1987), played a major role in reinforcing the notion that urns were specifically manufactured for burial. In a study of 2440 urns from eighteen cemeteries across early Anglo-Saxon England Richards found, for instance, that females were more likely to occupy vessels with above average rim diameters, infants were generally contained in shorter vessels than adults, and the use of decorative hanging arches correlated with adult males; in contrast standing arches correlated with adult females (Richards 1987, 136-9, 184-201). Although he acknowledged that many of these relationships were ambiguous and contradictory, he asserted that these findings 'confirm the view that the pots are *not* generally re-used domestic vessels, but are specifically produced for a funerary role' and that they 'were carefully manufactured with a particular "client" in mind' (Richards 1987, 206-7 emphasis added).

Despite Richards's identification of significant correlations between vessel decoration and human remains, these relationships do not in themselves demonstrate that these urns were manufactured for a specific client. Indeed, the urns may simply have been selected from a range of available alternatives, with each selection being made on the grounds of a 'culturally controlled set of symbolic rules' (Richards 1987, 206). Richards rejected this suggestion, however, based on the evidence of firing defects – such as spalling and warping – which are often identified on cremation urns. He argued that if a pot was being produced for a specific individual then it could not be substituted by another, even if it was damaged (Richards 1987, 206). Ultimately, however, these firing defects only give us an indication of drying and firing conditions (for example, see Rye 1981), they do not confirm that a vessel was made for a specific individual. Moreover, claiming that the Anglo-Saxons saw spalling as 'damage' is perhaps attempting to apply modern western sensibilities to the material. There is no evidence to suggest that this is how firing defects were viewed.

Other evidence used to support the hypothesis that urns were produced for the funeral is similarly problematic. The lack of sooting on decorated urns, for example, may simply be due to the fact that not all pots are used for cooking. If an urn had been used to store water or grain in the home before it was selected for burial, then it would not be sooted but it would still have served a pre-burial domestic function. The small amount of decorated pottery found in settlement contexts can also be explained if we consider that urns were obtained from the domestic sphere. For instance, decorated pottery might have accounted for just a small proportion of a settlement's entire ceramic assemblage – for example, for every nine plain pots there may have been only one decorated pot. At the time of a death a decorated pot may have been selected for use as an urn from the vessels that were available in the settlement; subsequently this pot would be buried in the cemetery. Assuming that the decorated pot was replaced at a later date, then, with each successive funeral the number and proportion of decorated pots in the settlement would remain constant, whilst the number and proportion in the cemetery would increase. Such a situation would wholly account for the small proportion of decorated pottery found in settlements and the inflated levels seen in cemeteries.

In recent years a number of scholars have presented evidence that challenges this specialist urn-production hypothesis and the domestic/funerary dichotomy. For example, Ailsa Mainman (2009, 590) reported that the ceramic fabrics of pottery recovered from the cemeteries and the adjacent settlement at Mucking were 'nearly identical', whilst Mark Brisbane (1984, 32) recorded that the petrographic analysis of pottery fabrics from vessels found in the cemetery and settlement at Spong Hill (Norfolk) are 'strikingly similar'. As well as a similarity in fabrics, there is no difference between the types of decoration found on pots recovered from settlements or cemeteries. Indeed, similar motifs were employed in both the Mucking settlement and cemeteries, and Diana Briscoe (2009, 606) records that there are even pots in both contexts that had been decorated with the same stamping tool. The same situation can be seen at Spong Hill, where the decoration found on pottery in the settlement draws from the same repertoire as seen on urns in the adjacent cemetery (Hills 1977; Hills *et al.* 1981; 1984; 1987; 1994; Rickett 1995). The forms of pottery found at settlements and cemeteries have also been used to argue for non-funerary production. The forms of pottery from Mucking, for example, demonstrate that whilst there are some contrasts between the settlement and cemeteries – for instance, jars predominate in the cemeteries, whilst bowls and dishes are almost absent − there is considerable overlap between the range of forms found in both contexts (Hirst and Clark 2009, 603, 610).

Based upon the cumulative evidence of decoration, fabric and form, Sue Hirst and Dido Clark (2009, 610) concluded that none of the urns found at Mucking 'need have been made specifically for burial'. Instead, they proposed that they may have been the personal storage jars of the deceased. Their conclusions certainly accord with Andrew Russel's (1984, 543) suggestion that the globular form and narrow everted necks of some of the decorated vessels from the settlement at West Stow (Suffolk) made them unsuitable for cooking, but appropriate for the storage of water or some other frequently used commodity. However, like the arguments for specialist funerary production of urns, none of this evidence demonstrates that the urns were obtained from the domestic sphere. All it really tells us is that jars may have been considered more suitable containers for cremated remains than bowls or dishes, that no ceramic fabric was considered more appropriate for making an urn than for a domestic pot, and that similar decorative schemes are found on pots retrieved from both funerary and domestic sites.

To summarise, the evidence used to support the two contradictory arguments – specialist funerary production *versus* the domestic re-use hypotheses – can only be described as circumstantial. It is only the 2-3% of urns that exhibit sooting patterns for which we can, with any certainty, suggest a pre-burial biography. If we are ever to understand the origins of funerary urns we must attempt to identify a range of characteristics, other than the presence or absence of sooting patterns, which are indicative of use. Of particular relevance to this work, then, are the *use-alteration* studies of David Hally (1983), James Skibo (1992) and John Arthur (2002; 2003) which illuminate the range of ways in which ceramic vessels may be used and the ensuing use-alteration characteristics that develop as a result of this use.

Chapter 2 explores the use-alteration phenomenon in detail, focussing in particular on the characteristics that develop as a result of different types of ceramic use. It then presents the results of a use-alteration analysis of the pottery obtained from the cemeteries of Cleatham and Elsham and the early Anglo-Saxon pottery find-sites that surround them (see below). This analytical method has never been attempted on Anglo-Saxon pottery, yet as will be demonstrated, by examining individual urns for subtle indicators of use (other than the easily, if rarely, identified sooting patches) it is possible to explore the pre-burial origins of every urn. The analysis demonstrates that the majority of cremation urns show signs of having being used prior to their burial (see also Perry 2011).

As ethnographic studies of pottery-producing and pottery-using societies demonstrate, the sizes and forms of vessels are often directly related to their intended functions (e.g. Henrickson and McDonald 1983). Thus, the realisation that cremation urns took part in production and consumption activities prior to their burial forces us to reconsider the significance of urn form and its relation to vessel use. Chapter 3, therefore, examines the ways in which Anglo-Saxon vessel forms have traditionally been studied, before considering how the functional properties of individual forms might have allowed them to partake in the production and consumption of food and drink. It will be demonstrated that Anglo-Saxon potters held clearly-defined mental templates of form, and that each of these forms probably fulfilled a specific role in processes of production and consumption.

Cemetery Organisation

Decoration

The most frequently studied aspect of Anglo-Saxon cremation urns has undoubtedly been their decoration. Decoration has traditionally been seen as means by which to determine the likely origins of incoming migrants (Myres 1969; 1977); as an epitaph which records details about the ethnicity, age, gender and status of the person whose cremated remains are contained within the urn (Richards 1987); as a means by which to identify the works of individual potting workshops and potters (Arnold and Russel 1983; Briscoe 1981; Green *et al*. 1981; Myres 1969; 1977); as a chronological marker for plotting the movement of migrants throughout the English landscape (Myres 1969; 1977); and, finally, as a way if gaining insight in to the way that burial was organised in cremation cemeteries (Hills 1980). Whilst each of these separate threads of research will be discussed in detail in Chapter 4, it is worth elaborating on the latter strand here as this work provides a basis for investigation into how burial in the cemeteries of Elsham and Cleatham was organised.

In her analysis of the Spong Hill cemetery, Catherine Hills identified in excess of 40 stamp-linked groups; that is, urns which share the same decorative stamp, or combination of stamps, and might, therefore, derive from the same workshop, or individual potter. Most groups consist of about five urns, but the largest, Stamp Group 7, contains 31. Whilst the urns in these groups are not identical, their forms and decoration do fall within a limited range and most belong to a single fabric group.

These characteristics and the geospatial distributions of the stamp groups within the cemetery (Figure 1.2) led Hills to conclude that specific areas of the cemetery were being used by separate communities or families (Hills 1980, 204-6).

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Figure 1.2: The location of stamp-linked groups in the Spong Hill Cemetery; note the clustering of Stamp Group 7 (Hills 1980, Figure 9.2).

Stamp groups are not a phenomenon restricted to the cemetery of Spong Hill, indeed they are known at cemeteries throughout early Anglo-Saxon England. Fourteen were identified at Millgate (Newark-on-Trent), for example, and like the stamp groups at Spong Hill, the forms and decorative schemes of urns belonging to particular groups are very similar, whilst each of the groups are seen to nucleate in specific areas of the cemetery (Kinsley 1989, 13-5, 185). Just four stamp groups were identified at the cemetery at Thurmaston but, interestingly, two urns belonging to Stamp Group 2 were stratigraphically related. Here, urn 76 cut through urn 77, suggesting that some time may have elapsed between the two burials; again this implies family ties, but also that the grave may have been marked in order that it could be located for the second burial (P.W. Williams 1983, 14).

The study of stamp groups potentially provides a window into the way that early Anglo-Saxons were burying their dead and, in particular, the way that cemeteries may have been organised. The scrutiny of such groups does, however, direct analysis towards a very restricted number of urns. Indeed, of over 400 urns recovered from Millgate, only 53 were attributed to one of the fourteen stamp groups. Whilst these 53 urns were discussed in the context of their relationship to others in their group (in terms of their decoration, forms, and locations within the cemetery) no such comment was afforded to the remaining urns; these were simply relegated to formulaic descriptions in a catalogue (Kinsley 1989). Since stamp groups have received so much attention in relation to other vessels, we must ask what stamp groups actually tell us about burial practices and pottery production more broadly? People who were buried in urns belonging to stamp groups, for example, might have been following a form of mortuary organisation separate to that of their peers. That is, they may have been the only members of society who manipulated decoration to reflect lineage or kinship and buried their dead in family plots. Alternatively, it might be that most people were buried in family groups but that the producers of stamp-grouped urns were moving towards a level of standardisation not followed by their pottery producing peers. It is simply because of their attempts at consistency that we are able to identify these putative family burial areas.

That individual potters chose to decorate vessels in different ways is borne out by Richards's (1987) observations regarding the frequencies of different decorative motifs and the way that these motifs were used at different cemeteries throughout early Anglo-Saxon England. For example, he noted that standing arch motifs were more common than hanging arches at the cemetery of South Elkington (Lincolnshire), whilst the reverse was true at Illington (Suffolk). Although the chevron motif was commonly used as a means of urn decoration at the cemeteries of Sancton (Yorkshire) and South Elkington, upright chevrons were more common than reversed chevrons at South Elkington, with the opposite being true at Sancton (Richards 1987, Table 9). Thus, if different communities in different areas of the country were using the same range of motifs, but they were employing them in slightly different ways, then there is every reason to suspect that the same situation was happening on a more localised level. Were the potters at one settlement, for example, favouring the use of a certain motif, whilst those in a nearby settlement were not using that motif at all? If this was the case, and the early Anglo-Saxons were burying their dead in community and family plots, then by plotting the distribution of motifs (rather than just stamp groups) within cemeteries it is possible that we might gain a greater understanding of the way cemeteries were organised. For this reason, Chapter 4 considers and compares the types of decoration used at the cemeteries of Cleatham and Elsham, and then explores the spatial distribution of decorative types within the individual cemeteries.

Ceramic Fabric Distribution

In addition to regional differences in the usage of decoration, in the last 25 years or so authors have begun to draw attention to the different ways in which early Anglo-Saxon potters in various parts of the country, and even within the same region or settlement, tempered their clays (Blinkhorn 1997; Russel 1984). Such observations accord with numerous ethnographic studies which demonstrate that choices made at all stages of pottery production are based on a deeply embedded, unconscious, set of social rules, or *habitus*[2] (Arnold 1985; Gosselain 1992; 1994; 1998; 1999; Mahias 1993). It is not unreasonable, therefore, to suggest that *habitus* may have influenced the Anglo-Saxon potter's choice of manufacturing techniques (Blinkhorn 1997).

Andrew Russel's work on early Anglo-Saxon pottery from 36 settlement sites in East Anglia certainly supports the notion that *habitus* influenced pottery production in this period. He identified discrete spatial distributions in the types of tempers used by potters. For example, grog[3]- and vegetal-tempered pottery fabrics were common on some sites but rare on others. By producing contour plots of the frequencies of occurrence of these different types of fabric, he was able to demonstrate that grog-

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[2] *Habitus* consists of a series of 'principles which generate and organise practices ... objectively 'regulated' and 'regular' without being in any way the product of obedience to rules, they can be collectively orchestrated without being the product of the organising action of a conductor' (Bordieu 1992, 53).

[3] Grog-tempering involves the crushing of fragments of pottery and then adding it to clay as temper.

tempered fabrics were most frequent on sites forming a northeast-southwest axis across the study area, whilst vegetal-tempering formed an axis at right angles to this distribution (Figure 1.3). As the geology in his study area provides abundant deposits of sand – another potential, and easily exploited, source of temper – it is puzzling why these alternative types of temper were so commonly used. Furthermore, as grog-tempering does not occur in any significant frequency anywhere else in early Anglo-Saxon southern England, Russel suggested that the temper choices might be influenced by cultural tradition (Russel 1984, 547-9).

Figure 1.3: Contour plots of the frequencies of occurrence of grog-tempered ceramics and vegetal-tempered ceramics in East Anglia (Russel 1984, Figure 12.3).

Russel's observations certainly support Paul Blinkhorn's (1997) assertions that *habitus* influenced Anglo-Saxon pottery production. Blinkhorn proposes that the spatial distribution of fabric types at a number of settlement sites may indicate the occupation of different areas of the settlement by people of different cultural origins. At North Raunds (Northamptonshire), for example, whilst sand- and grit-tempered ceramics were found in all areas of the site, they appeared as the major ware-types in certain areas. Sand-tempered ceramics were concentrated in the part of the site which saw the focus of the middle Anglo-Saxon activity, and the gritty-fabrics focused in the areas of earlier occupation. This distribution was first interpreted as having technological and chronological significance. It was assumed that two contemporary groups of potters were operating on the site, one group tempering with naturally-occurring sand, whilst the other used the more time-consuming method of crushing rock. Seeing that a quicker and more efficient method of pottery manufacture was available, over time this second group switched to using sand. This interpretation accounted for the inflated quantities of sand-tempered pottery in later features and suggested that the grit-tempered pottery found in later features was residual (Blinkhorn 1997, 119).

When this interpretation was applied to the nearby early to middle Anglo-Saxon site of Pennyland (Milton Keynes), just 30km from North Raunds and located on similar geology, the interpretation was seen to be flawed. The geological constraints and the proximity of these two sites unsurprisingly resulted in a similar range of fabrics and temper types being utilised. At Pennyland, however, the sand-tempered pottery was seen to concentrate in the earlier areas of the site, whilst the supposedly earlier grit-tempered pottery focused in the subsequent middle Anglo-Saxon areas. As Blinkhorn notes, factors of re-deposition may have affected these distributions, but as no decorated early Anglo-Saxon pottery was found in any of the middle Anglo-Saxon features, such an interpretation is unlikely (Blinkhorn 1997, 119). These distributions, he advocates, are the result of *habitus*, suggesting that the fluctuations and distributions in temper type can be accounted for by fluctuations in the numbers of people of different cultural backgrounds within an individual settlement.

If distinct concentrations of ceramic types are seen in settlements, and can be seen to represent people of different cultural traditions, we must ask whether similar distributions can be identified in funerary contexts. The clustering of fabric types is, in fact, something that is being increasingly noticed in the analysis of pottery from cemeteries. At the cemetery of Mucking Ailsa Mainman noted that, whilst all fabric types occur throughout the site (suggesting that there was not clustering of fabric-types), urns tempered with calcareous materials appear to have a more south-easterly distribution within the site, whilst those made of sandy-fabrics and grass-tempered fabrics have a more westerly distribution (Mainman 2009, 589-90). A similar pattern was recorded at Sancton (Yorkshire), with all fabric types being found across the cemetery site, but with certain types occurring more frequently in some areas then others (Timby 1993, 273). At Lackford (Suffolk), tight clusters of urns made in sandy fabrics were identified, and Russel (1993, 110) suggested that this might be indicative of burial in family groups.

In the recently-published analysis of pottery from the middle Saxon settlement site of Flixborough (North Lincolnshire), Jane Young and Alan Vince plotted the spatial distributions of fabric-types from find-sites in the whole county of Lincolnshire. Their work revealed that some types occur more frequently in certain areas than others. However, the majority of sites in their study were located in central and southern Lincolnshire; indeed, only seven early and middle Anglo-Saxon sites from North Lincolnshire were included in their plots. This is only a fraction of the 80 find-sites that actually exist in this area (see below). The present study will plot the geographical distributions of fabric types from all 80 sites identified in North Lincolnshire, thereby enabling identification of subtle patterns in fabric distribution. If different settlements were producing and using different types of fabric, plotting the distribution of fabrics within the cemeteries themselves will allow exploration of whether different communities were burying their dead in community plots. Chapter 5, therefore, considers the fabric of pottery found at the cemeteries of Elsham and Cleatham and the settlement sites that surround them. Specifically, it investigates the geographical distributions of fabric types within North Lincolnshire as a whole and the individual cemeteries themselves. Having considered the background to the questions posed at the beginning of this chapter, that will allow us to better understand cemeteries as individual entities and the way that burial was organised within them, the following discussion considers the possibility that cremation cemeteries served as centralised burial places.

Settlements, Cemeteries and Tribal Territories

> Its *size* and location *central* to the other probably early Anglo-Saxon settlements of Goodmanham, Londesborough, Market Weighton, North Newbald, and Nunburnholme, suggest that it may have been a *central* crematorium serving the surrounding Anglian communities.
>
> (Faull 1976, 231, emphasis added).

The above observations were made of Sancton (Yorkshire), a cremation cemetery of c.340 cremations (Faull 1976, 231; Timby 1993, 243-4). Faull's comments represent the first assertion that these cemeteries were large-scale depositories serving a number of dispersed communities. In recent years this idea has gained momentum and it has even been argued that they represent 'centralised burial places' which may have possessed their own 'tribal territories' (Leahy 1993, 36; Williams 2004a, 114; Williamson 1993, 68). A large amount of evidence has been gathered to support such claims and no scholar has been more proactive in collecting and analysing this data than Howards Williams (2002b; 2004a). In addition to the characteristics identified by Faull – a central location and large burial population – from Williams's work we can now add a number of other common features, including topographical location, relationship to pre-existing monuments, and proximity to major routes and track-ways. The following discussion reviews each characteristic before moving on to question the validity of the way that the centralised territorial theory has been investigated. It will then be demonstrated how we can use ceramics to test these claims and to investigate the extent of these putative territories.

Size of Burial Population

In most cases we know virtually nothing about the hinterlands of Anglo-Saxon cremation cemeteries (Williams 2004a, 119) and it is extremely rare to find a settlement which can be directly related to a cemetery. In the few instances where the latter has been possible we know little of the settlement's full extent, as they have not been fully excavated or indeed, not excavated at all. Fortunately, Mucking provides the exception and a benchmark by which to compare the size of settlement and cemetery populations.

Mucking

Between 1965 and 1978 excavations at Mucking uncovered two cemeteries, totalling 808 burials (346 inhumation and 463 cremations), and an adjacent settlement comprising 203 sunken featured buildings (SFBs) and c.65 post-built structures (Table 1.1 and Figure 1.4). The cemeteries appear to have been in use from c. AD 425 to c.625, whilst the settlement was occupied from the fifth to the eighth century. It is believed that c.42 of the settlement's post-built structures and 149 SFBs were contemporary with the cemeteries, equating to an average eight post-built structures and thirteen SFBs standing at any point in time (Hirst and Clark 2009, 1-2,763-4).

From this data, varying estimates of the cemeteries' living population have been calculated. Hamerow (1988, 128-31) initially suggested c.60 individuals per generation, but in light of new dating evidence this was later corrected to 125-149, whilst Hirst and Clark suggest a minimum 94 and a maximum 136 individuals.[4] Despite considerable variation between these estimates, they do at least provide an indication of the size of population needed to produce a large cemetery and from these approximations there is little to suggest that the burial population originated from anywhere other than the adjacent settlement (Hirst and Clark 2009, 1-2,763-4). With an appreciation of the size of population needed to supply a cemetery of a minimum 808 individuals over 200 years we can now consider the largest known Anglo-Saxon cremation cemetery against the settlement evidence.

Spong Hill

Between 1972 and 1984 Spong Hill was fully excavated, revealing c.2700 cremations, 57 inhumations, and an adjacent settlement site (Figure 1.5). From her analysis of the cremated remains, Jacquie McKinley suggested that over the 150-200 year life of the cemetery, to provide the whole burial population, at any single point in time it would be necessary to have a living population of between 56 and 96 family units each of eight individuals (McKinley 1994, 70). If one considers the three 'halls' and six/seven SFBs identified to the north-west of the cemetery, and also compares this data with that from Mucking (Table 1.1 and Figure 1.5), the size of this adjacent settlement certainly does not seem able to sustain anything like the number of people required to provide the burial population. Although it is acknowledged that this settlement has not been fully excavated, crop marks do provide an indication of its extent and it appears that even if it were fully investigated it would not have been able to support the number of family units required (McKinley 1994, 70).

[4] Hamerow's original estimate was based on the assumption that the settlement and cemeteries were wholly contemporary (Hirst and Clark 2007, 764). Hirst and Clark's estimate is calculated from an assumption of 38-46 individuals (of a reproductive generation), spread between 8-10 households, with each household containing an average of 4-5 adolescent and adult individuals along with 3-4 children (Hirst and Clark 2009, 763-4).

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Figure 1.4: Mucking excavated area, note the proximity of the settlement to the cemeteries (Hamerow 1988).

	Spong Hill	**Mucking**
Number of excavated burials	c.2700	808
Settlement and cemetery life span	c.150-200 years	c.200 years
Average number of burials per annum	c.13.5-18	4.6-5.5
Living population estimates (at any point in time):		
Hamerow		60 per generation
corrected Hamerow		125-149
Hirst and Clark		94-136
McKinley	446-768	
Contemporary settlement remains	6/7 SFBs	149 SFBs
	3 'halls'	c. 42 post-built structures
Average number of standing structures (at any point in time)		c.8 post-built structures
		c.13 SFBs

Table 1.1: A comparison of the Spong Hill and Mucking settlement and cemetery data (derived from Hamerow 1988, 128-131; Hirst and Clark 2009, 1-2,763-4; McKinley 1994, 70).

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Figure 1.5: Excavated area of Spong Hill (Norfolk); note the post-built structures and sunken-featured buildings in the north-west corner (Hills *et al.* 1994, Figure 149).

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Figure 1.6: The area surrounding Spong Hill, note the evidence for early Anglo-Saxon activity (McKinley 1994, Figure 2)

Figure 1.7: Evidence of early Anglo-Saxon activity around cremation cemeteries. Clockwise from top: Loveden Hill, Cleatham and Millgate. Note the second cemetery just to the north-east of Loveden Hill (Leahy 2007a, Figure 5; Williams 2002b Figure 4; Kinsley Figure 2).

Based on this demographic data, it seems probable that the remains of people *were* brought to the Spong Hill cemetery for burial from elsewhere. Encouragingly, an examination of the surrounding area demonstrates that the cemetery is indeed central to a number of sites with evidence for early Anglo-Saxon settlement (Figure 1.6). Consideration of the landscape around other cemeteries presents a similar pattern; Cleatham, Millgate, Loveden Hill and West Keal (Figures 1.7 and 1.9), for example, all have evidence of settlement within a few kilometres of the respective cemeteries (Kinsley 1989, Figure 2; Leahy 2007a, 5; Williams 2002b, Figures 4 and 5).

The Location of Cremation Cemeteries

There does not appear to be a uniform pattern in the location of cremation cemeteries, but studies do suggest that their location was not randomly chosen either; they are frequently shown to be related to distinctive topography, existing route-ways and monuments, as well as places of late Roman political authority (Williams 2004a, 119). Williams believes that these features combined to enable cremation cemeteries to function as 'central places for ceremonies and rituals surrounding death' and as centres of socio-political cohesion, integral to the reproduction of group identities and political authority (Williams 2002b, 342, 357). Each of these characteristics will now be discussed.

Prominent Locations

Cremation cemeteries often occupy prominent topographical locations. For example, Sancton cemetery is positioned on the western facing slope of the Sancton Wold, overlooking the present village of Sancton (Timby 1993, 245). Likewise, Loveden Hill, as its name suggests, is located on a prominent hill and although the land to the east of the site is slightly higher, the hill is one of the most striking and easily recognised landmarks in the vicinity. Its position, Williams argues, demonstrates a desire for the cemetery to be visible from the higher ground in the east but also from the lower lying land around the Witham Valley in the west. This location makes the cemetery and surrounding settlements 'intervisible', allowing the living to overlook the dead and the dead to overlook the living in their everyday activities (Williams 2004a, 119-20).

Prehistoric and Roman Monuments

The founders of cremation cemeteries appear to have had a desire to locate these burial grounds close to pre-existing monuments. For example, inhumations and cremations abut and overlay a Bronze Age barrow at Abingdon (Oxfordshire) (Williams 1997, 6) and in excess of 100 urns were buried in the prehistoric ditch at Elsham (Figure 1.16 (Leahy 2007a, 12). This practice of reuse stretches the breadth of early Anglo-Saxon England and extends from single burials to the largest of the inhumation and cremation cemeteries. Indeed, Williams (Williams 1997, 1, 4; 1998, 92-4) identified 334 instances of appropriation from over 1200 known Anglo-Saxon burial sites (c.25%). Monuments reused include megalithic long barrows and earthen long barrows, henges, stone circles and linear earthworks, and Iron Age square barrows. Moreover, when one considers only the sites that were excavated to 'modern' standards, the incidence of reuse is greatly increased and may be as high as 54% (Williams 1997, 1, 4; 1998, 92-4).

Although not as widely appropriated as the prehistoric features, Roman monuments were also reused for burial throughout the fifth to seventh centuries. Structures employed include villas, mausolea, cemeteries, temples, barrows, forts and roads, with the type of reuse ranging from enclosure by, insertion within, and alignment on these Roman features (Williams, 1997, 9-14; 1998, 94). Ancaster (Lincolnshire), for example, is just beyond the limits of a Roman walled town. Similarly, Millgate is situated adjacent to a Roman roadside settlement, and Cleatham is just c.500m from a Roman villa (Leahy 2007a, 5; Williams 2002b, 347; 2004a, 124).

The incorporation of these monuments into cemeteries may have influenced the way in which the cemetery was entered, or they may even have served as platforms for the performance of certain rituals and mortuary rites (Williams 1998, 91, 99). They may also have been seen as powerful liminal places, the dwelling places of ancient beings and ancestral spirits, and enactment of mortuary rituals and union of the newly deceased with these ancient places may have served to negotiate and construct social and group identities (Williams 1998, 103). Indeed, as there was a long-lived tradition of this practice in the Germanic 'homelands' during in the pre-Roman Iron Age, perhaps this was a continuation of the rite and an attempt by immigrant communities to create and legitimise an imagined ancestry (Williams 1997, 22-3, 25; 1998, 95, 104).

Networks, Route-ways and Roman Roads

Cremation cemeteries were generally well served by pre-existing route-ways (Williams 2002b, 350-355). Sancton, for example, lies just to the east of the Roman road from Brough-on-Humber to Malton (Vince 2004, 1) and Elsham all but touches the prehistoric route-way known as Middlegate Lane (Berisford and Knowles n.d., 2; Eagles 1989, 204). Waterways can also be added to the range of infrastructure utilised; Loveden Hill is visible from the River Whitham, while Millgate is just 250m from the confluence of the rivers Devon and Trent (Kinsley 1989, 3). These route-ways may have provided a processional route along which the corpse or ashes were carried to the cemeteries (Williams 2002b, 350-5; 2004a, 114).

Summary

In summary, cremation cemeteries such as Spong Hill, Loveden Hill, Cleatham and Elsham appear to be too large to be sustained by an individual settlement; their dispersed and prominent locations, proximity to pre-existing monuments and route-ways, and the evidence for early Anglo-Saxon activity in the areas around the sites suggest that they may, indeed, have acted as centralised burial sites. With such evidence in mind a number of scholars have attempted to identify putative catchment and territories that these cemeteries might have served.

The Catchment Areas of Cremation Cemeteries

The cemeteries of Loveden Hill and Millgate, which are just c.15km apart, were established in the fifth century. Bruce Eagles (1989, 211) suggests that both cemeteries were founded to serve communities in distinct 'Anglian territories' – Millgate in the area of the North Mercians and Loveden Hill in that of the Middle Angles. Leahy has similarly considered the distribution of cremation cemeteries throughout Lincolnshire (Figure 1.1), and reports that as they are 'equally spaced', each of 'the five large' cemeteries may each have possessed 'its own territory' and that these 'territories' might represent the 'original folk groupings of the settlement period' (Leahy 1999, 129). He proposed that the banks of the Humber were served by Elsham and Bagmoor, the middle of the Wolds by South Elkington, the southern edge of the Wolds by West Keal, and the west of the county by Cleatham (Leahy 1993, 36; 1999, 129). In an attempt to determine the catchment area of Spong Hill, McKinley considered its proximity to other cemeteries in Norfolk. Based on the assumption that settlements would use their nearest available cemetery, she determined that a 5.5 to 10 mile elliptical catchment area might have existed around this cemetery (Figure 1.8) (McKinley 1994, 70-71).

Figure 1.8: McKinley's proposed Spong Hill catchment area (McKinley 1994, Fig. 15).

When cemetery distribution is considered alongside characteristics of location (see above) it cannot be denied that there is a compelling body of evidence to suggest that large cremation cemeteries of this period were the ‘centralised’ crematoria suggested by Faull (1976, 231). Despite this, there are questions over how these catchment areas are investigated and, in particular, how we understand their extent. For example, Leahy (1993; 1999), Eagles (1989) and McKinley (1994) have all identified putative catchment areas solely by considering the spatial distribution of cemeteries. The problem with this approach, however, is that it overlooks the evidence provided by *settlements*. Surely, if we are attempting to identify catchment areas of cemeteries, then we should also be considering their locations with respect to the settlement sites that used them.

A further problem with the exploration of catchment areas is that even when the locations of cemeteries and settlements are considered together, little indication is ever provided about how these sites fit into the wider Anglo-Saxon landscape. For example, Figures 1.7 and 1.9 are taken from Williams’s (2002b) paper ‘Cemeteries as Central Places – Places and Identity in Migration Period Eastern England’; here we see that each cemetery is placed at the centre of an arbitrary c. 5km by 5km field of view and that evidence of settlement is plotted around them. Whilst these figures do clearly demonstrate that there is evidence for settlement around the respective cemeteries, we do not know what lies beyond the c.5km by 5km box, or how far this evidence for settlement actually stretches. It is quite possible that if Williams included a larger area, containing a number of cemeteries, we might find that there is a relatively continuous spread of settlement evidence between them. This would be in complete contrast to the impression that we are given here by Williams, namely that cremation cemeteries lay at the heart of discrete concentrations of settlement.

The occurrence of smaller burial grounds within the putative catchment areas of large cemeteries represent a further complication to understanding of large cremation cemeteries and their territories . Looking again at Loveden Hill, for example, we see that to the east of the site there is another burial ground – a sixth-century inhumation cemetery with 30 interments (Figure 1.7) (Williams 2004a, 121). This is not an isolated occurrence; when one considers the rest of the county of Lincolnshire it soon becomes clear that many small fifth- and sixth-century inhumation and mixed-rite cemeteries are intermingled with the large cremation cemeteries. Fonaby, for example, located midway between South Elkington and Elsham, contains twelve cremations and 49 inhumations. Worlaby, a cemetery of twelve cremations and a single inhumation is just c.4 km north-west of Elsham, and the larger inhumation cemetery of Castledyke, appears to have been in use throughout the life of the large cremation cemeteries (Eagles 1989, 209; Leahy 1993, 39-42). This intermingling of smaller cemeteries is not restricted to Lincolnshire; Figure 1.10 shows the locations of cemeteries and the settlements in the Lark Valley (Suffolk) whilst Figure 1.6 shows the proximity of Spong Hill to a smaller inhumation cemetery just 2km north of the site.

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Figure 1.9: The locations of Baston and Loveden Hill cemeteries with respect to evidence for early Anglo-Saxon settlement (Williams 2002b, Figures 3 and 4).

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Figure 1.10: The Lark Valley, Suffolk (adapted from West 1985, Figure 4).

Whether or not these small cemeteries were, as Williams suggests, founded slightly later (perhaps up to a generation later) than the large cremation cemeteries, we know that once established they continued to be used alongside their larger neighbours (Williams 2004a, 115). Conditions may have been such that certain groups were, for some reason, denied access to the large cremation cemeteries; alternatively, they may simply have preferred to inter their dead in a smaller cemetery. Whatever the reason, it appears that people living in alleged 'catchment areas' or 'territories' had other burial options open to them; therefore, people would not, by default, necessarily be interred at centralised or territorial burial places (Williams 2004a, 115). Until we understand the relationship between settlements and larger cremation cemeteries, we will be unable to consider how smaller cemeteries interacted with their larger neighbours. It is a major aim of this thesis, then, to shed further light on the relationship between large cremation cemeteries and their surrounding settlements.

Arbitrarily selecting study areas and joining dots on maps is clearly not a valid way to study these settlement and cemetery relationships. We must attempt to establish empirical and testable methodologies through which to investigate the relationship between large cemeteries and their surrounding settlements. The problem, however, is that cemeteries and settlements are very different types of site and their methods of formation are poles apart; settlement remains are the result of continued occupation and day-to-day activity where natural actions and reactions, using domestic material culture, continually create and modify 'lived in' vestiges. On the other hand, cemeteries may only have been visited on occasion and the main visible remains of human action are the result of contrived funerary practices. As urn burials rarely intercut one another there are few discernible relationships between them and each burial stands alone as a discreet archaeological deposit representing a single moment in time.

Furthermore, as cinerary assemblages consist of burnt remains and a restricted range of grave goods (such as iron implements, glass beads, fragments of bone comb and cremated animal remains), there is often very little evidence to tie settlements to cemeteries. However, the situation is not as bleak as it might first appear. One form of material culture common to both types of site are ceramic vessels; at the cemeteries these are the urns, whilst at settlements they are the domestic cooking, serving and storage pots. A comparative analysis of this common material culture is a key element of this research.

Using Pots to Investigate Hinterlands

As discussed earlier in the chapter, for at least the last 70 years the majority of scholars believed that cremation urns were manufactured especially for the funeral. Yet none of the evidence which has been used to support these claims stands up to scrutiny. Use-alteration analysis of cremation urns from Elsham and Cleatham demonstrates that the majority were used domestically before their burials (Chapter 2; Perry 2011). Thus, if there truly is no distinction between cremation urns and domestic pottery, then we must ask whether we can identify, through the analysis of ceramic fabric types, the settlements from which these urns originated. In order to consider whether such an approach is possible we must examine how pottery was produced and distributed in the early Anglo-Saxon period.

The Production of Pottery in the Early Anglo-Saxon Period

It is generally accepted that the production of pottery in early Anglo-Saxon England was small scale, undertaken at household level for individual consumption.[5] No scholar has demonstrated this more convincingly than Andrew Russel (1984). Through detailed petrographic analysis of pottery from 36 early Anglo-Saxon settlement sites in East Anglia, Russel showed that the pottery fulfilled every characteristic of Prudence Rice's (1981) criteria for the identification of household production in the archaeological record. Rice's (1981, 222) criteria are as follows:

> 1. There should be little uniformity in technological characteristics such as kinds and proportions of clays and tempers and (perhaps because of incomplete knowledge) firing conditions.
> 2. Although similar styles of decoration and form reflect current ideas ("mental templates") of what a bowl or jar should look like, there should be variation based on idiosyncratic factors (skill, time spent, etc.).
> 3. Although "use"-functional distinctions should be apparent (e.g., among forms), "social"-functional (i.e., status-reinforcing) differences should not be evident. There should be no class of pottery which can be inferred to be "elite" by virtue of unusual appearance or unusual depositional context.
> 4. There should be small (e.g., household) concentrations of similar paste, form, design, not an even distribution of these traits over the site.

[5] David Peacock (1982, 8) characterises household production in the ethnographic records as pottery made by individual households for their own consumption. Production is secondary to other economic and subsistence concerns and may be seen a 'chore', 'on a par with cooking and cleaning'. The range of vessel types is functional and made according to 'time-honoured cultural recipes'. Production is sporadic, with firings being on an 'as the need arises' basis. Indeed, producers might only fire one vessel at a time. The limited and sporadic nature of production means that no investment in technologies, such as the wheel or kiln, is needed.

Russel's results revealed that, while there was relative uniformity in temper (in that a small range of types were utilised throughout his study area; for example, dung, grog, and sand), the same type of *temper* was not always added to the same type of *clay* (Rice's first criterion). There is no evidence for kiln structures in the early Anglo-Saxon period, nor is there any consistency in firing conditions, thus all evidence points to the firing of pottery in simple bonfires (Rice's first criterion). The conditions in bonfire firings are such that, once lit, it is difficult to fully control temperate and air flow in the fire. The range of pottery forms is limited, although types do appear to have been manufactured according to mental templates (Rice's second criterion). No 'elite' types were identifiable, with the range of decoration, fabric and form being the same in both settlement sand cemeteries (Rice's third criterion). Russel acknowledged that household concentrations of fabric types were difficult to identify, due to the limited size of excavations and the fact that pottery was largely recovered from secondary contexts. However, at Grimstone End, where large scale excavation was undertaken, it was possible to show that certain types of temper were focused in specific areas of the site (Rice's fourth criterion) (Russel 1984, 577-8). These findings accord with Blinkhorn's observations of the distributions of fabric-types at Mucking, North Raunds and Pennyland (see above and Blinkhorn 1997).

Russel's analysis also revealed that potters do not appear to have travelled over long distances to obtain raw materials for pottery production (Russel 1984, 568). His results are complemented by a number of other petrological analyses of early Anglo-Saxon pottery, which have demonstrated that raw materials were likely to have been obtained from within just a few kilometres of the sites from which the pottery was excavated (Arnold 1988, 76; Arnold and Russel 1983, 25; Williams 1992, 6; Vince 2007b; 2004, 15; Vince *et al.* 2008, 8). It is also apparent that pottery rarely travelled any great distance from its point of production to final place of deposition (Arnold 1988, 76; Arnold and Russel 1983; Vince 2008, 4).[6] There is, therefore, very little evidence for the exchange and movement of pottery in this period.

[6] One fabric for which large scale distribution from a single source area has been argued − however, are the acid igneous rock-tempered, so-called Charnwood-type fabrics (Williams and Vince 1997). It was long thought that the source of these igneous clasts was to be found in the Mountsorrel granodiorite, a series of granitic rocks which crop out in modern Leicestershire, and that this pottery was manufactured in this single area and then distributed throughout midland and eastern England (Williams and Vince 1997; Ixer and Vince 2009). However, a recent analysis of Charnwood-type fabrics from North and East Yorkshire has demonstrated that whilst a very small number of these Yorkshire samples did potentially originate from Leicestershire, the vast majority were produced locally, using materials that were available within the vicinity of the sites at which they were found (Ixer and Vince 2009). It seems, then, that whilst Leicestershire-produced Charnwood-type fabrics were moving around eastern England, the extent to this was happening was on nothing like the scale previously conceived.

In light of the evidence that there was little movement of pottery in the early Anglo-Saxon period, Chris Arnold (1981, 246) has made the following observations which are the foundations on which much of the present study is built. He reports that, if pottery was manufactured at a settlement level by individual households and then transferred to a cemetery, it is the '*distance from the chosen cemetery* that controls the *distance of deposition* from the point of production of the urn' and, consequently, 'the *burial pattern* may be a stronger force in determining the *dispersal patterns* [of pottery] than the system of trade and exchange' (Arnold 1981, 246 emphasis added). Comparing pottery from settlements and cemeteries, then, should allow us to plot distribution patterns of identical fabric types. As these distribution patterns are influenced more by the choice of cemetery than the trade of vessels, they should mirror the burial pattern, potentially revealing relationships between cemeteries and settlements and communities' choices of burial ground (Figure 1.11). These identical fabric types are identified through detailed petrographic analysis, discussed in Chapter 5.

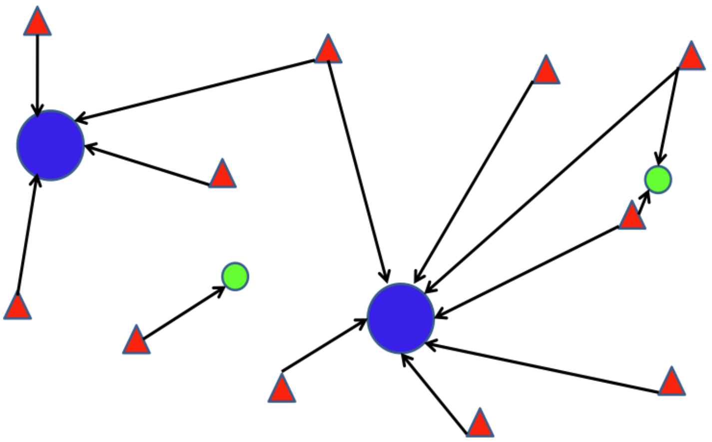

Figure 1.11: A possible burial pattern identified through the analysis of ceramic fabrics. Blue circles represent large cremation cemeteries; green circles represent mixed rite, inhumation and smaller cremation cemeteries; and red triangles represent settlements sites (based on Arnold 1981, Figure 17.3).

As discussed above, in the rare cases where a cremation cemetery has been found with an adjacent settlement, petrological analysis has demonstrated that the fabrics of pottery recovered from both settlement and cemetery contexts was identical (Brisbane 1980; Mainman 2009). However, if we are to employ petrological analysis as a means of identifying settlement sites from which cremation urns might have derived, and thus ascertain the catchment areas of these cemeteries, we must look beyond those cemeteries with adjacent settlements and be certain that we can pinpoint identical fabrics in settlements and cemeteries which are *not* immediately adjacent to one another. In the material attributed to the so-called Illington/Lackford Potter it appears that such analysis is, indeed, possible.

Illington/Lackford Pottery

Illington/Lackford pottery is a collection of late sixth-century pottery which, on stylistic grounds, has been attributed to the work of a single potter or potting workshop. Pottery of this type first came to light in 1937 when Myres drew attention to a number of well-made vessels, from Lackford and West Stow (both Suffolk), which shared common decorative elements (Myres 1937, 391) (Figure 1.12). Over the next fifty years or so, vessels of this type were identified on ten sites in Suffolk, including Lakenheath, Lackford and Illington (Russel 1984, 477-8, 520). Myres (1969, 132) coined the name ‘Illington/Lackford’ in 1969, naming the workshop after the two cemeteries which had produced the greatest quantities of these vessels.

Figure 1.12: Urns attributed to the Illington/Lackford workshop (Davison *et al.* 1993, Figure 25; Myres 1937, Figure 3).

The geographical distribution of these Illington/Lackford pots led Myres to suggest that the work of this potter, or potters, was the nearest thing to commercial production known in the early Anglo-Saxon period, and he provided over 100 examples of this type in his *Corpus* (Myres 1937, 391; 1977, 349-56; Russel 1984, 478, 484). In 1981, macroscopic study of Lackford/Illington material was undertaken; this study identified thirteen fabrics within the tradition (Green *et al.* 1981). It was not until 1984 that petrographic analysis was undertaken on Illington/Lackford urns, when Andrew Russel examined 116 of these vessels in thin section (Russel 1984). His analysis divided the pottery into two broad groups – those made of silty-clay and those made of sandy-clay. These two groups were further separated in to 20 sub-fabrics (Russel 1984, 520).

Out of the 20 sub-fabrics, five appear on more than one site, suggesting that either a number of communities were using the same clay source to produce similar vessels, or that they were being manufactured in a single area and then traded (Russel 1984, 522). Vessels manufactured in the sandy-clay fabrics were found on all ten Illington/Lackford sites and this distribution would certainly appear to suggest a developed system of exchange (Russel 1984, 524). The silty-clay fabrics, on the other hand, are less dispersed, being confined mainly to the northern Illington/Lackford find-sites, such as Lakenheath, Illington and Thetford. Indeed, thirteen of these silty fabrics are found at a single site – Illington (Russel 1984, 525, 8). Russel's analysis of two sites where Illington/Lackford pottery was identified, West Stow and Lackford, have particular relevance to this study and, as such, background information on these sites and a brief discussion of Russel's results are provided here.

Excavations at Lackford in the late 1940s recovered over 500 urns, 23 of which were subsequently attributed by Myres (1969; 1977) to the Illington/Lackford potter. Crop marks and domestic pottery spreads directly north of the site imply that there was a settlement associated with the cemetery. Although this putative settlement remains unexcavated, the extent of the remains suggests that the cemetery could not have been supported by this site alone. Examination of the surrounding area reveals other early Anglo-Saxon settlements, including West Stow, just one mile east of Lackford (Figure 1.10) (Lethbridge 1951; Russel 1984, 478; West 1985, 140).

The multi-period settlement and cemetery site of West Stow has a long history of investigation. Local people were known to have collected material from the site between 1849-52 after sand extraction revealed quantities of human remains, Anglo-Saxon grave goods and pottery. Although no accurate record of the cemetery was ever made, it is believed that in the region of 100 people were buried there (West 1985, 9, 65). Excavations concerned with the Anglo-Saxon settlement were undertaken from 1965-1972. The excavations recovered almost 70 SFBs and fourteen post-built structures (West 1985, 10-53), but of interest to this particular study are the Illington/Lackford vessels retrieved from the cemetery and the Illington/Lackford sherds assembled from the settlement.

Petrographic analysis of Illington/Lackford pottery demonstrates that sandy-clay Fabric 7 and silty-clay Fabric 2 both *only* occur at the cemetery of Lackford and settlement of West Stow. Although the exact place of production of these vessels is unknown, it certainly demonstrates that it is possible to identify examples of early Anglo-Saxon pottery in disparate funerary and non-burial contexts which have a common source. With this in mind, a regional study of cemetery and settlement material should, therefore, allow the identification of domestic and funerary vessels with a common source, which in turn will allow clear 'ceramic hinterlands' to be drawn around cemeteries. Having discussed the major issues surrounding the study of cremation urns thus far, it is now time to consider the cemeteries and non-funerary sites that will be studied in an attempt to address these issues.

Study Cemetery: Cleatham

Location

The cemetery of Cleatham is located on land belonging to Cleatham House Farm in the parish of Manton, North Lincolnshire. It rests on the crest of the Lincoln Edge, a Jurassic Limestone escarpment which runs north-south down the western side of the county (Figure 1.1) (Leahy 2007a, 3-4). Three kilometres to the east is the Roman road of Ermine Street, connecting the cemetery with Lincoln, whist 22km to the north the Humber Estuary provides a direct link to the North Sea. Some 7km to the east is the River Ancholme, which along with its flanking marshland would have provided a major obstacle for east-west movement in the early Anglo-Saxon period (Leahy 2007a, xvii, 30).

Discovery and Excavation

Cleatham has a long history of investigation, the cemetery having first been identified in 1856 when workmen, building a road along the parish boundary of Manton and Kirton-in-Lindsey, reported finding 50 to 60 cremation urns in a small mound. Unfortunately, after retrieving brass tweezers from one of the urns, the workmen smashed the pots to pieces (Leahy 2007a, 1; Trollope 1857, 275-6). Only seven urns escaped destruction and these vessels found their way into a number of museums, later being illustrated in Myres' 1977 *A Corpus of Anglo-Saxon Pottery of the Pagan Period*. The cemetery appears in the studies of Myres (1977) and Meaney (1964) under the name Kirton-in-Lindsey, yet it would appear that the workmen's finds were made on the northern edge of the parish of Kirton-in-Lindsey, on the boundary with Manton. It was assumed that these finds represented the northern limit of a Kirton-in-Lindsey cemetery but it is likely that what they had discovered was the southern extent of the Cleatham cemetery which spreads northwards into Manton (Leahy 2007a, 2).

The first modern archaeological excavations of the site were undertaken in 1979 after surface finds of pottery and burnt bone were reported to North Lincolnshire Museum. The excavations recovered ten vessels, of which only three were represented by anything more than their bases, and it was feared that the cemetery had been all but ploughed out. Interest in the cemetery was renewed in 1984 when further finds were reported; fieldwork was once more undertaken and the results again suggested that the cemetery had been destroyed. Nonetheless, in 1985, after learning that deep-ploughing was to take place on the land, it was determined that further excavations should take place. The work was undertaken in five three-week seasons, ending in September 1989, and resulted in the near-complete excavation of the cemetery and the recovery of the remains of 1204 urns and 62 inhumations and demonstrated that the cemetery had been in use from the early fifth century through to the late seventh century (Eagles 1989, 209; Leahy 2007a, xvii, 2-3; 2007b, 38).

Excavation was undertaken in 2x2m squares, the topsoil being removed by hand to ensure no damage to the archaeological features and allowing un-stratified sherds to be recovered and then returned to the vessels from which they had been separated. Subsoil was excavated in 100mm spits as problems were experienced in identifying archaeological features and it was rarely possible to locate the edges of the urn pits (Leahy 2007a, 23). In most cases urns were lifted in soil blocks and excavated on the tabletop away from the site; however, intercutting vessels were excavated *in situ* so that stratigraphic relationships could be determined (Leahy 2007a, 23).

Cemetery Layout, Boundaries and Prehistoric Features

Although the burials seem to have been confined to a band of deeper subsoil running north-south across the field, no boundaries to the cemetery were identified. The main burial area appears to have been divided into two linear concentrations, separated by c.5m of clear ground, with both bands being densest in the north, thinning towards the south (Figure 1.13) (Leahy 2007a, 23- 5). A shallow ditch runs along the northern edge of the site and this ditch seems to have limited the northern expansion of the *cremation* cemetery; however, notably, *inhumations* were found beyond the limit of this boundary (Leahy 2007a, 23). Pottery and re-deposited grave goods found in the ditch demonstrate that it was contemporaneous with the cremation cemetery, but as Grave 13, an inhumation dated to the later sixth century, was cut into the fill of this ditch it is assumed that it had been filled and was out of use by the end of the sixth century (Leahy 2007a, 23-5). Leahy's phasing of the cemetery (see below) suggests that there was no nodal point around which the cremation cemetery grew; indeed, the whole site appears to have been in use from its inception to its demise (Leahy 2007a, 25-29).

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Figure 1.13: Cleatham excavated area; note the ditch along the cemetery's northern edge and the two 'bands' of burials (Leahy 2007a, Figure 8a).

The location of the cemetery apparently corresponds with Williams's (1997; 1998) observation that cemeteries of this date are often sited close to earlier monuments, as there are indications that the site grew around pre-existing features. The cemetery was located within 500m of a Roman villa at Mount Pleasant; indeed, Roman masonry presumed to derive from this villa was found in the fill of inhumation Grave 36 (Leahy 2007a, 5, Pl. 17). Moreover, Edward Trollope's 1857 account reports that 'Mr Richardson ... on making a road on his land, had occasion to cut through a slightly raised mound' and it was from this 'mound' that the urns were recovered. Furthermore, he reported that 'on the northern side of the vases a quantity of stones were found – perhaps connected with the Ustrina[7] and above them from 4 to 5 feet of soil had been heaped to form a tumulus' (Trollope 1857, 275-6). Although no trace of this tumulus was noted during the modern excavations, Leahy has stated that there is little doubt that this feature did, indeed, represent the remains of a burial mound or a natural feature which in the past had been perceived as an earlier barrow (Leahy 2007a, 5).

Ceramic Analysis

A notable success of the Cleatham project was the development of decorative 'Urn Groups' and the identification of stratigraphic relationships between urns. Indeed, on the basis of these relationships the urns were assigned to chronological 'phases' which ultimately led to the complete phasing of the cemetery (Leahy 2007a, 29). As Leahy's grouping and phasing will be employed to investigate the growth and development of the Elsham cemetery it is now appropriate to consider the background to these groups and phases, as well as their implications for understanding of early Anglo-Saxon cremation cemeteries.

On the basis of Cleatham urns' decorative schemes, Leahy assigned each vessel to an 'Urn Group'. Leahy began his grouping with the simplest form of decoration, with subsequent groups becoming progressively more complex (Table 1.1 and Figure 1.14). For example, Group 01 urns are plain and undecorated, while Group 02 urns have horizontal lines around the neck. In Group 03 we advance from simple horizontal lines to horizontal lines which enclose incised decoration and Group 04 is characterised by multiple horizontal bands of decoration. Each of these groups is then further divided into sub-groups; for example Group 02a urns have only horizontal rings of plain incised or impressed decoration around the neck, while Group 02b urns also have bosses and Group 02s urns have stamps, (Figure 1.15) (Leahy 2007a, 68-71, 91-94).

[7] An 'Ustrina' is a place of burning or cremation ground.

Urn Group	Attributes
00	Urns which are not reconstructible
01, b p	Plain, undecorated vessels
02, a b s	Horizontal rings around the vessel’s neck
03, a b s	Defined horizontal band containing decoration
04, a b n s	Multiple horizontal bands containing decoration
05, a b n s	Continuous band of vertical, or angled, grooves or bosses around the vessel
06, n q s	Massed or random stamping
07, a b n s	Grouped vertical and angled grooves or bosses
08, a b m s	Counter-angled lines or matting
09, b n s	Urns decorated with bows which contain decoration
10, a b s x	Rings and chevrons, not defined in a band
11, a q s	Hanging bows
12, a b n s	Standing bows
13, b n	Panelled decoration
14, a b n	Incised cursive designs
15, s	‘Daisy-Grid pots’ often with filled pendant triangles
16, b	Sancton-Elkington style
17, s	Sancton-Baston urns
18, a s	Urns decorated with chevrons and hanging bows
19, b n	Asymmetrical band of decoration, non-repeating
20, n	Chevron and boss decoration
21	‘Roman’ vessels
22, n s x	Unclassified urns with no parallels on site

Key:

a. Plain incised or impressed decoration
b. Vessels decorated with bosses
m. Vessels with modelled decoration
n. Vessels decorated with both stamps and bosses
p. Vessels bearing perforated bosses
q. Vessels related to a group but which cannot be assigned to it with full confidence
s. Vessels decorated with stamps
x. Vessels with complex decoration

Table 1.2: Cleatham Urn Group classification system (after Leahy 2007, 69, Table 5). Examples of Groups 01, 02, 03 and 04 are presented in Figures 1.14 and 1.15.

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Figure 1.14: Examples of Leahy's urn groups (Leahy 2007c).

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Figure 1.15: Group 02 urns; clockwise from top left 02a, 02b, 02s (Leahy 2007c).

Cleatham Classification	Earliest Phase	Latest Phase	Cleatham Classification	Earliest Phase	Latest Phase
01	1	5	10s	3	4
01b	1	5	10x	5	5
01p	3	5	11a	?	?
02a	3	3	11q	4	4
02b	1	1	11s	5	5
02s	2	4	12a	?	?
02n	?	?	12b	1	1
03a	2	2	12n	?	?
03b	?	?	12s	4	4
03s	1	3	13a	?	?
04a	4	4	13b	1	4
04b	1	1	13n	1	1
04n	?	?	13q	?	?
04s	2	2	14a	1	1
05a	1	2	14b	1	1
05b	2	2	14n	1	1
05n	4	4	14s	?	?
05s	1	2	15s	4	5
06s	2	2	16b	1?	1?
06n	2	2	17s	4?	4?
06q	2	2	18a	?	?
07a	1	1	18q	?	?
07b	1	2	18s	3	4
07n	2	2	19b	1	1
07s	2	2	19n	4	5
07q	?	?	19q	?	?
08a	3	3	19s	2	2
08b	?	?	20n	1	3
08m	1	1	20s	?	?
08s	?	?	20x	?	?
09b	1	1	21a	2	2
09n	5	5	22a	?	?
09s	2	2	22b	?	?
10a	1	1	22n	?	?
10b	?	?	22s	?	?
10q	?	?	22x	?	?

Table 1.3: Phases attributed to each of the Cleatham Groups (data derived from Leahy 2007a, 89-112).

Phasing

The intercutting relationships determined between urns allowed the decorative groups to be correlated with phases within the life of the cemetery. These phases were developed on the following assumptions; that urns cut by the burial of another urn represented earlier and later burials respectively and that urns of the same decorative group, or sub-group, and those buried side-by-side were contemporary. This allowed chronological links between separate burial groups to be established, based upon which Leahy developed a Harris matrix. This matrix identified five phases in the cemetery's life (Phase 1 being the earliest and 5 being the latest) and demonstrated that different decorative groups belonged to specific phases (Leahy 2007a, 68-71).

Many decorative groups were assigned to a single phase, whilst others were considered to have been in use over a number of phases (Table 1.3). It is acknowledged, however, that the length of time separating successive burials and phases remains unknown. Nonetheless, the transparent nature of Leahy's groupings appears to provide an easily accessible and robust method through which to compare and 'date' cremation urns, something which has long been lacking in the study of Anglo-Saxon cremation urns (Kidd 1976; Leahy 2007a, 63-7; Morris 1974). Using his decorative groupings, Leahy was able to parallel urns from other excavated cemeteries within England. On many occasions the dates of artefacts associated with urns from other cemeteries agreed with the 'phases' suggested for them by the Cleatham groupings. For example, Spong Hill urn 2143 is decorated in the style of Cleatham Group 10a, which belongs to Cleatham Phase 1, and it was associated with an applied disc brooch dated to AD 450-500. Meanwhile, Lackford urn 50.126 is decorated in the style of Group 11s, which at Cleatham belongs to Phase 5. This Lackford urn was associated with a great square-headed cruciform brooch dated AD 510-550 (Leahy 2007a, 68-71; 89-122).

So, in some cases it is true that artefacts associated with urns at cemeteries other than Cleatham corroborate the 'dates' suggested by the Cleatham phasing (in other words, Leahy's 'early' urns are associated with early artefacts, while 'later' styles are associated with later artefacts). However, we must be wary of uncritically applying this phasing to sites beyond Cleatham, since these phases have not been tested against stratigraphic relationships between urns from other cemeteries. For instance, we cannot say for certain whether an urn decorated in the style of Leahy's Group 04b, which at Cleatham belongs to Phase 1, should be considered as an 'early' style of decoration when found at another cemetery. Even if it was associated with an artefact with an ‘early’ date, we do not know how long the ‘early’ artefact (or the urn) was in circulation before being buried in the urn. As the excavators of the Elsham cemetery recorded the stratigraphic relationships between the cemetery’s urns, and the present author had access to their records, it was possible to critically assess the applicability of Leahy’s method of grouping and phasing to cemeteries beyond Cleatham (Chapter 4).

Although Leahy did attempt some level of ceramic fabric analysis in his study of the pottery from Cleatham, he chose to devise his own method of classification, rather than using the East Midland’s Anglo-Saxon Pottery Project (EMASPP) fabric type-series, which is the standard method of recording pottery fabrics from Lincolnshire (Vince and Young 1991; 1992). As all material deposited in the county’s museums is expected to be recorded in accordance with this EMASPP type-series, Leahy’s use of a ‘home made’ fabric typology leaves Cleatham’s pottery isolated and difficult to compare to that from the rest of the county. It is the intention of this project, therefore, to classify the fabrics of the Cleatham and Elsham urns, and the pottery from the non-funerary find sites, according to these standardised typologies, thus allowing for direct comparisons between and within the sites.

Study Cemetery: Elsham

Location

The early Anglo-Saxon cremation cemetery of Elsham, c.15km north-east of Cleatham, lies 245 feet above O.D. on a chalk plateau close to the western escarpment of the northern Lincolnshire Wolds (Figure 1.1) (Berisford and Knowles n.d., 1; Leahy 2007a, 12). An ancient route-way, Middlegate Lane, forms the western edge of the cemetery and provides easy access to the Humber Estuary, just 11km north, and it follows a continuous north-south route along the western escarpment between South Ferriby in the north to Horncastle in the south (Berisford and Knowles n.d., 2; Webster and Cherry 1976, 209-10).

Discovery and Excavation

The cemetery was first discovered in February 1975 in the course of investigations undertaken to assess the threat posed to archaeological features by the planned Humber Bridge approach road. Sherds found on the edge of a disused Second World War airfield on Elsham Wold suggested the presence of a cremation cemetery, which the construction of this road would have destroyed (Berisford and Knowles n.d., 1). Rescue excavations conducted by Freda Berisford and Chris Knowles, funded by the

Department for the Environment, began in September 1975 and continued daily for about eighteen months (pers. comm. Freda Berisford; Berisford and Knowles n.d., 3). The excavations recovered 625 urns and five inhumations, with associated finds suggesting an early fifth- to late sixth-century date (Eagles 1989, 209; Leahy 2007b, 38).[8]

The site had often been ploughed to a depth of between nine and twelve inches (c. 22-30cm) and the excavations revealed that most of the urns had been damaged by these agricultural practices (Berisford and Knowles n.d., 1-2). Therefore, to prevent further breakage and loss of unstratified finds the top soil was removed by hand. Having identified the limits of the cemetery, the decision was made to strip the soil 10m beyond these limits by machine to identify any outlying urns; only one (urn EL76PD) was uncovered in this way (pers. comm. Freda Berisford; Berisford and Knowles n.d., 4). Excavation progressed across the site in 2x2m squares, with each find being identified by a find number and the square from which it was recovered. In post-excavation processing each 2x2m assemblage was laid out alongside the surrounding assemblages, allowing displaced sherds to be reunited with their parent vessels (pers. comm. Freda Berisford). Wherever possible, *in situ* excavation was undertaken and an attempt to locate grave cuts was made, however the nature of the geology and the damage caused by ploughing meant that no traces of these cuts could be identified. Fragmentary urns were lifted in one block, ensuring that material remained embedded in the surrounding soil, and were taken away from the site to be systematically excavated. Although the excavators recognised that important information may have been lost by removing urns from their contexts, it was felt that due to the short time available for excavation, the fluctuations in labour-force, weather conditions, and the extremely friable nature of the pottery, in the circumstances this was the most appropriate method of excavation (Berisford and Knowles n.d., 4).

Although a small part of the cemetery extends under Middlegate Lane, and remains unexcavated (Figure 1.16), it is likely that most of the cemetery was investigated. It must be acknowledged that, when one considers that a number of urns are likely to have been destroyed by the plough, leaving no trace at all, the total number of burials will be unquestionably higher than the 625 urns and five inhumations

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[8] Unfortunately, due to the excavator's ill health the results of these excavations have never been published. The present author is therefore indebted to Freda Berisford and Chris Knowles for allowing access to the archive in the preparation of this thesis.

recovered (Eagles 1989, 209; Leahy 2007a, 12). Even so, with these figures the cemetery remains the fourth largest Anglo-Saxon cremation cemetery in England (Leahy 1993, 40; 2007b, 38).

Cemetery Layout, Boundaries and Prehistoric Features

No evidence was found to suggest that the cemetery had been artificially enclosed (Eagles 1989, 209), but it does appear to have been divided into two, perhaps three, distinct zones (Figure 1.16). The most significant division is the separation of the main cemetery from a further group of c.100 urns in the top of a prehistoric ditch (see below). The main burial area may itself have been divided into a western and eastern group, as two ditches were identified which partially underlay the cemetery and are orientated at right angles to Middlegate Lane (Figure 1.16). The first 0.5m of these ditches cut through weathered chalk, but below this they cut 2m into relatively solid rock. There was no evidence in the ditch fills to suggest that either had been re-cut, nor were there any artefacts which would indicate the date of construction. Although the southern ditch does appear to turn through ninety degrees at its western edge, suggesting a possible entrance, neither the function, nor relationship between these two ditches could be determined (Berisford and Knowles n.d., 7-8; Webster and Cherry 1976, 209-10).

Figure 1.16: The Elsham site plan. Middlegate Lane forms the western boundary of the excavation. Note the dense concentration of urns in the southern ditch, and the area, just to the north of this ditch, that is devoid of burials – this suggests the presence of a now destroyed bank.

The insertion of Anglo-Saxon burials into the top fills of the ditches suggests that both had been filled by the late sixth century. As one Bronze Age beaker was found just to the north of the largest ditch, below a suspected bank (see below), and a second was found to the south, it was suggested that the ditch was later than the burials and that it cut through what may have been a small burial ground or barrow. Furthermore, the complete lack of Romano-British features and small number of Romano-British artefacts that were recovered fail to suggest any substantial activity on the site during this period; consequently, the excavators suggest that the ditches are likely to be Bronze or Iron Age in date (Berisford and Knowles n.d., 8-9).

There was an area just north of the southern ditch that was completely devoid of Anglo-Saxon burials and may indicate the presence of a now destroyed bank (Figure 1.16). Figure 1.17 shows a section through the edge of the ditch and the surrounding subsoil; the slight rise in ground level on the northern edge of the ditch certainly seems to support the suggestion of a destroyed bank. The absence of burials in this area implies that, if urns had been placed in the bank, the processes of natural erosion and ploughing may have since removed all traces of these burials (Berisford and Knowles n.d., 7). However, as no concentration of sherds or cremated bone was identified in this area it may be the case that no burials were inserted into the bank and that it provided a limit to the main burial area (Berisford and Knowles n.d., 8).

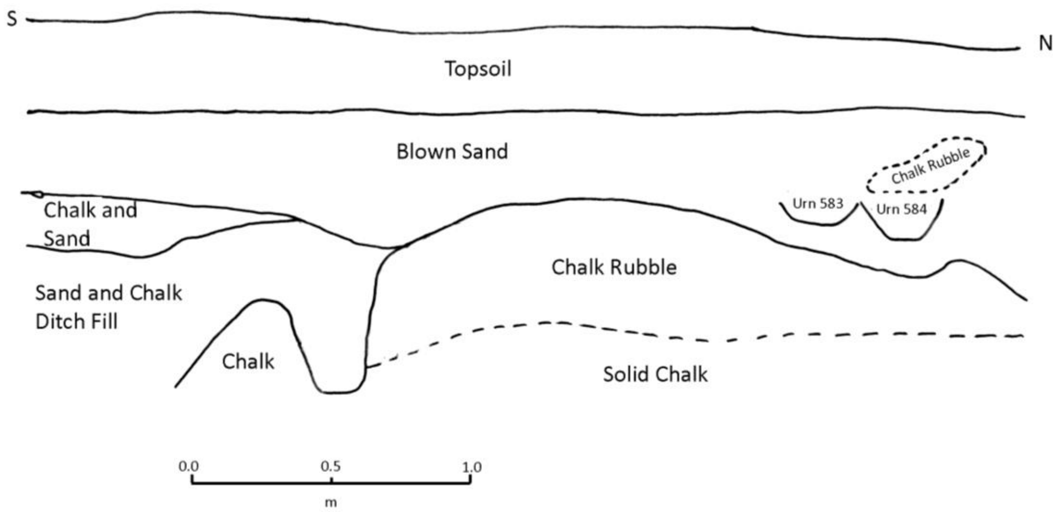

Figure 1.17: Elsham – section drawing of the northern side of the most southern ditch; note the evidence for the inner bank.

Results and Studies Stemming from the Excavation of this Cemetery

The level of preservation of the individual urns ranges from a handful of sherds to complete pots (Eagles 1989, 209). It was possible to reconstruct the profiles of just over 50% of these vessels; these were illustrated by the excavators, although never published (a number of these urns are illustrated in Appendix B). Post-excavation analysis identified a small number of sooted vessels that had evidently been used for domestic purposes prior to burial (Figure 1.18) (Webster and Cherry 1976, 209-10) and a number of vessels that were decorated in such a way as to be attributable to a single person or workshop. For example, the work of the so called 'Sancton/Baston workshop' (Figure 1.19) was identified – urns decorated in this distinctive style were first identified at Sancton (Yorkshire) and Baston (Lincolnshire), but have since been found at Cleatham (Leahy 2007a, 127-9; Myres 1977, 59-60). Pots attributed to the 'Sancton/Elkington workshop', whose products have been identified at Sancton, South Elkington (Lincolnshire) and Cleatham (Leahy 2007a, 127-129), were also identified (see Chapter 4 for further discussion on such 'workshops').

Some level of ceramic fabric analysis was attempted on the Elsham urns but as the following example of a fabric description from the archive demonstrates, this did not extend beyond simple categorisation: 'fabric: vegy and fine & coarse gritting – coarse grit/vegy series' (unpublished notes taken from excavators' record card for urn EL75GH). A more detailed analysis was subsequently undertaken by David Williams who examined thirteen thin sections (2% of the assemblage) and compared them with thin sections from the cemeteries of Sancton and Heyworth (Yorkshire) (Williams n.d., 1). He concluded that, although there were similarities between fabric types from all three sites, the question as to whether they were produced locally or further afield could only be answered once comparative samples from other Anglo-Saxon sites in the region had been analysed (Williams n.d., 6). The present study will attempt to answer this question.

Although the cemetery as a whole has never been published, a number of studies have utilised the material. Chris Arnold and Andrew Russel (1983) examined the stamps and ceramic fabrics of two urns in their study of urns attributed to the Sancton/Baston potter, whilst Julian Richards considered 205 of the cemetery's urns in his investigation into the relationship between form and decoration of cremation vessels and the individual(s) contained within (Richards 1984; 1987, 59; 1992).

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Figure 1.18: Sooted vessel, urn EL75IX, which contained the remains of a sub-adult/adult (pers. comm. Kirsty Squires).

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Figure 1.19: Examples of urns attributed to the Sancton/Baston workshop (Myres 1977, Figure 347).

Other Cemeteries in North Lincolnshire

As highlighted above, there a number of other early Anglo-Saxon cemeteries in North Lincolnshire, such as Bagmoor, Sheffield's Hill, Worlaby, and Castledyke South. As this study is concerned with the pottery from cremation cemeteries and the relationship between these cemeteries and settlements, no analysis of pottery from the inhumation cemeteries of Sheffield's Hill, Castledyke and Worlaby was undertaken. Although Bagmoor, like Elsham and Cleatham is a cremation cemetery, this cemetery was destroyed by ironstone mining in the 1928 and although 'many urns' were reported, only two escaped destruction; the full extent of the cemetery is unknown (Dudley 1949, 224-6; Leahy 2007a, 11-13).

Placing the Cemeteries in a Populated Landscape

Having explored the *cemeteries* that will be studied in this thesis, it is now pertinent to consider the evidence for *settlement* in North Lincolnshire. The pottery from these non-funerary sites will provide the data-set with which the funerary material will be compared. There is a considerable body of archaeological evidence for early Anglo-Saxon occupation in North Lincolnshire. Much of this derives from finds made in the course of ironstone mining, sand extraction, and archaeological fieldwalking; indeed there is only one definite early Anglo-Saxon site from the area – West Halton – that has been subject to archaeological investigations (Hadley *et al*. 2011)

A number of studies have drawn the evidence for early Anglo-Saxon settlement together. In 1949, Harold Dudley, for example, the then curator of Scunthorpe museum, published *Early Days in North-West Lincolnshire*. This volume presented the archaeological evidence for settlement from prehistory through to the Anglo-Saxon period, with specific emphasis being placed on the material that was held by his museum. It was not until 1979 with the publication of the gazetteer – *A Survey of Archaeological Sites in Humberside* – produced by Neil Loughlin and Keith Miller, under the request of Humberside Archaeological Committee (at the time of publication North Lincolnshire was part of the county of Humberside), that the archaeology of North Lincolnshire was re-examined. Also published in 1979 was Bruce Eagles' *The Anglo-Saxon Settlement of Humberside* which attempted to place Anglo-Saxon artefacts from the region in the context of the Anglo-Saxon settlement of England. As was typical of the time, this study focused on drawing parallels with continental pottery and metalwork, in an attempt to provide a chronology to the settlement of the area.

A further study, although unpublished, is the work of the North Lincolnshire Parish Survey (NLPS), undertaken in 2000 by Anne Boyle (the then Collections manger of North Lincolnshire Museum) and Jane Young (Young and Boyle 2000).[9] The survey examined the collections held by North Lincolnshire Museum in an attempt to produce a gazetteer of sites from North Lincolnshire where Anglo-Saxon and medieval pottery had been found. As the aim was simply to identify these sites, no quantification of the material was undertaken, nor was there any significant attempt to classify the individual fabric types occurring at each site. Not all of the museum's assemblages and collections were examined and as such this study remains incomplete (Jane Young pers. comm.). Nonetheless, it provides a useful source of reference for identifying assemblages containing comparative pottery for this study.

The works of Dudley (1949), Loughlin and Miller (1979), Eagles (1979) and the NLPS have been drawn together in the monument records held by North Lincolnshire HER (Historic Environment Record Office) and English Heritage's online database of historic sites, Pastscape. As the HER and Pastscape databases also include details of more recent discoveries made in the course of developer-led excavation, they are considered to be the most up-to-date sources of information for early Anglo-Saxon activity in North Lincolnshire. These various sources, as well as the North Lincolnshire Museum's accession database, were consulted when identifying early Anglo-Saxon non-funerary sites in North Lincolnshire. The following discussion provides an overview of the extent of settlement evidence in North Lincolnshire.

The Evidence for Settlement

The only site in North Lincolnshire for which excavation has provided definite early Anglo-Saxon settlement remains are those undertaken at West Halton (Hadley *et al.* 2011). Interventions, carried out by the University of Sheffield from 2003 to 2009, revealed a sunken-featured building, numerous post-built structures and an extensive system of ditches. The site provided very little evidence of middle Saxon activity, but late Saxon and medieval occupation is clearly demonstrated. Post-excavation analysis is ongoing and we must await full publication of the results but early indications are that the early Anglo-Saxon pottery assemblage will be well in excess of 3000 sherds. The author analysed the fabrics of a sample of over 400 early Anglo-Saxon sherds from this site as part of an MA dissertation (Perry 2009a). The results of this analysis were incorporated in to the current study.

[9] The author is grateful to Jane Young for providing a copy of this database.

Other sites yielding large assemblages of early Anglo-Saxon material include Manton Warren, Messingham, Scotton and Melton Ross. In 1939, workmen digging for sand at Manton Warren uncovered a hanging bowl, iron slag, loom weights, and considerable quantities of pottery (in the present study the author counted 496 sherds from this site – see Appendix D.1). Pottery, iron slag, beads, glass, and bronze were found amongst the sand hills around Messingham (260 sherds counted by the present author – see Appendix D.1), whilst an assemblage of similar composition was found at Scotton (154 sherds – see Appendix D.1) (Dudley 1949, 229-35). These three sites are all within 5km of Cleatham. Recent metal detecting has identified a so-called 'productive site' at Melton Ross, 3km south-east of Elsham. Considerable quantities of pottery and metalwork of early Anglo-Saxon date have been uncovered at this site (Leahy 2007b, 130-3) (the author of the present study counted a total of 153 sherds from Melton Ross).

Finds made in the course of mining and metal-detecting are complemented by those obtained from a recent community archaeology project undertaken by North Lincolnshire Museum. This ongoing project, which started in 1999, involves intensive fieldwalking campaigns in four areas of North Lincolnshire: Lincoln Edge (around Cleatham), the hills around the Isle of Axeholme, the Chalk Wolds (close to Elsham), and along the River Trent at Alkborough. As Leahy acknowledges, the results obtained in these areas are extremely variable. The largest numbers of finds were made around Cleatham, whilst they produced little evidence for early Anglo-Saxon occupation around Elsham, and only a handful of finds were made from sites in the Isle of Axeholme and at Alkborough (Leahy 2007b, 127-8).

Although the fieldwalking results are variable, when these are combined with the evidence from the studies by Dudley, Loughlin and Miller, Eagles, the NLPS and the records held by the HER (Scunthorpe), we find that there is a substantial body of evidence of early Anglo-Saxon occupation. Indeed, by consulting these various sources the present author has identified 80 early Anglo-Saxon non-funerary *pottery* find-sites in North Lincolnshire (Figures 1.20 and 1.21 and Table 1.4). It must be stressed at this point that these find-sites only represent places where pottery has been identified. No attempt has been made to consider the locations of other find-types. It also ought to be appreciated that these find-sites do not represent 80 separate settlements. For example, some sites have yielded materials on a number of occasions and as such each find-incident appears in the museum's records as a separate find-site. Finds made on a site at Crosby Warren, for instance, are held by the museum under the code CRW; each find-incident at this site was given identifier such as CRWA, CRWB, CRWC, and so on. It must also be acknowledged that the amount of evidence for settlement at each site is extremely variable. For example, some find-sites are represented by only a single sherd of pottery found whilst fieldwalking (for example, site OS2074, a fieldwalked site south of Cleatham village). Others sites, such as Manton Warren, (MTBX) comprise large assemblages of pottery, metalwork, loom weights and slag, which were found in the course of sand extraction. Further to this, at West Halton (WHA) evidence for early Anglo-Saxon occupation is unequivocal with actual structures having been excavated (see above). Details of each find-site, comprising the types of finds, grid-references, monument numbers, site codes, further references, and museum accession numbers are supplied in Appendix A. The results of use-alteration analysis of pottery from these find sites are discussed in Chapter 2, whilst the results of fabric analysis are presented in Chapter 5.

By simply plotting the locations of these non-funerary find-sites with respect to the location of the cemeteries (Figure 1.20) we immediately gain a greater understanding of the catchment areas served by Elsham, Cleatham and Bagmoor. Such an overview of the landscape of early Anglo-Saxon North Lincolnshire has been absent in other attempts to identify putative catchment areas. In the first instance it reveals the locations of a number of cemeteries with the respect to the surrounding non-funerary sites (*contra* Leahy 1993; 1999). It also shows the distribution of sites over a large area. Indeed, this study considers the locations of three large cremation cemeteries and 80 non-funerary find-spots spread over an area of c. 45km by 30km. This far exceeds the 5km by 5km boxes presented by Williams (2004a) in his attempts to demonstrate that cremation cemeteries lay at the heart of discrete clusters of settlement evidence.

What emerges from this distribution plot is that there are three discrete clusters of find-sites, the nuclei of which are the three cemeteries of Cleatham, Elsham and Bagmoor. In each case the radii of these clusters is seen to extend to c.5km around the respective cemeteries. One could argue that these distributions developed as a result of the locations of fieldwalking campaigns undertaken by North Lincolnshire Museum. However, only 31 of these 80 non-funerary find-sites were discovered in the course of these campaigns (all those sites with a site code starting OS – Table 1.4). Moreover, no

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Figure 1.20: The locations of the 80 early Anglo-Saxon non-funerary pottery find sites in North Lincolnshire. Note that the find sites nucleate around the cremation cemeteries (see Table 1.4 for details of sites and also Figures 1.21a-c for enlargements of the dense clusters of non-funerary finds sites that surround the three cemeteries of Bagmoor, Elsham and Cleatham).

fieldwalking was undertaken around the Bagmoor cemetery, yet this cluster still exists and mirrors the pattern noted around the cemeteries of Elsham and Cleatham. We can also add to this distribution plot all those sites in North Lincolnshire which have been the subject of archaeological intervention, be it in the form of watching briefs, excavation, fieldwalking, finds made in the course of mining and sand extraction, and chance finds reported to the museum by members of the public (Figure 1.22). As numerous archaeological interventions have taken place in the areas between the clusters of early Anglo-Saxon pottery find-sites, the clustering of sites around the cemeteries must be considered a genuine archaeological pattern.

Figure 1.21(a): Detail of the non-funerary pottery find sites that surround the now destroyed cremation cemetery of Bagmoor (see Table 1.4 for details of site codes). Continued on following page.

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Figure 1.21(b): Detail of the non-funerary pottery find sites that surround the cremation cemetery of Cleatham (see Table 1.4 for details of site codes).

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Figure 1.21(c): Detail of the non-funerary pottery find sites that surround the cremation cemetery of Elsham (see Table 1.4 for details of site codes).

Table 1.4: Early Anglo-Saxon Non-Funerary Pottery Find Sites in North Lincolnshire. Site codes are as they appear in North Lincolnshire Museum, where these collections are held (continued overleaf)

Site Code	Site Name	Parish
AKAA	Countess Close	Alkborough
AKWW	Westcroft, Walcot	Alkborough
BBAJ	Barnetby le Wold, Fieldwalked Site 3	Barnetby Le Wold
BBAL	Barnetby le Wold, Fieldwalked Site 1	Barnetby Le Wold
BBAN	Barnetby le Wold, Fieldwalked Site 6	Barnetby Le Wold
BBNB	Barnetby le Wold, Fieldwalking Site A	Barnetby Le Wold
BLAR	Sandtoft, East Side	Belton
BLBR	Sandtoft STE4	Belton
BLCA	Belton	Belton
BNAM	New Vicarage Pottery	Barton Upon Humber
BNAS	Hoe Hill Brickworks	Barton Upon Humber
BNAX	Saxon Close	Barton Upon Humber
BNBE	Tyrwhitt Hall	Barton Upon Humber
BNPQ	33 Norman Close	Barton Upon Humber
BOAG	Templar's Bath Field	Bottesford, Manley
BOBD	Holme Lane	Bottesford
BSAA	Bagmoor Farm	Burton Upon Stather
BSAD	Bagmoor (Field 7)	Burton Upon Stather
BSAE	Bagmoor, Field 8	Burton Upon Stather
CAAG	Caistor	Caistor
CRWA	Crosby Warren	Scunthorpe
CRWB	Crosby Warren, Keeper's Cottage	Scunthorpe
CRWE	Crosby Warren	Scunthorpe
CWBG	Field CE II	Crowle
ELAI	Field West Of Elsham Village	Elsham
ELAN	Elsham	Elsham
ELBA	Anglo Saxon Vessel	Elsham
ELBB	Elsham	Elsham
ELXX	Elsham	Elsham
FXAE	Grangebeck North	Flixborough
FXAF	Grangebeck North	Flixborough
GXBA	Goxhill (Foreshore)	Goxhill
GXBC	Goxhill	Goxhill
HBBB	Manton Lane	Hibaldstow
HORJ	Bottesford Beck	Holme
KLAT	2 Ings Road Garden	Kirton In Lindsey
KSWY	Winghale Priory	South Kelsey
MRBD	5 Council Villas	Melton Ross
MRBF	Melton Ross Welbecks Spring Site	Melton Ross
MSAB	Mell's Farm, Messingham	Messingham
MSBV	Belle Vue Farm, Messingham	Messingham
MSBW	Belle Vue Farm	Messingham
MSHB	Messingham	Messingham
MSMB	Mell's Farm	Messingham

Site Code (contd.)	Site Name (contd.)	Parish (contd.)
MTAS	Gilliate's Grave, Manton	Manton
MTBV	Manton	Manton
MTBX	Manton Warren	Manton
MTCC	Manton Site 3	Manton
MTCF	Manton Site 6, Middle Manton	Manton
MTCH	Greetwell Hall, Manton	Manton
MTDB	Manton Warren, Next To Gillate's Grave	Manton
MTFW	Middle Manton Fieldwalk	Manton
OS0003	North Lincs Museum Fieldwalked Site	Manton
OS0033	North Lincs Museum Fieldwalked Site	Manton
OS0034	North Lincs Museum Fieldwalked Site	Manton
OS0093	North Lincs Museum Fieldwalked Site	Elsham
OS0528	North Lincs Museum Fieldwalked Site	Alkborough
OS1752	North Lincs Museum Fieldwalked Site	Kirton In Lindsay
OS2074	North Lincs Museum Fieldwalked Site	Manton
OS3000	North Lincs Museum Fieldwalked Site	Elsham
OS3137	North Lincs Museum Fieldwalked Site	Kirton In Lindsay
OS3400	North Lincs Museum Fieldwalked Site	Elsham
OS4757	North Lincs Museum Fieldwalked Site	Winteringham
OS5500	North Lincs Museum Fieldwalked Site	Manton
OS6223	North Lincs Museum Fieldwalked Site	Owston Ferry
OS6500	North Lincs Museum Fieldwalked Site	Owston Ferry
OS6838	North Lincs Museum Fieldwalked Site	Kirton In Lindsay
OS7354	North Lincs Museum Fieldwalked Site	Whitton
OS8500	North Lincs Museum Fieldwalked Site	Manton
OS9075	North Lincs Museum Fieldwalked Site	Alkborough
OS9109	North Lincs Museum Fieldwalked Site	Epworth
RXSN	Ryecliffe Field	Roxby Cum Risby
SFAG	South Ferriby Primary School	South Ferriby
SNAC	Scotton B	Scotton
TCBB	Burnham Beaches Thornton Curtis	Thornton Curtis
THAB	Thealby Ironstone Mine	Burton Upon Stather
THDD	Thealby	Burton Upon Stather
WGMCL	Hewde Lane	Winteringham
WHA	West Halton	West Halton
WRAAI	Near Elsham Station	Wrawby

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Figure 1.22: A plot of the locations of all archaeological interventions in North Lincolnshire alongside the locations for the cremation cemeteries of Elsham, Bagmoor and Cleatham and the 80 non-funerary pottery find sites. Note that numerous interventions have taken in the spaces between the clusters of non-funerary pottery find sites. These clusters are therefore real and not a result of targeted intervention.

Summary

This chapter provides the background to the various strands of research that will be followed in this thesis; namely, the pre-burial origins of cremation urns, how burial was organised in cremation cemeteries of Elsham and Cleatham, and the extent of the catchment areas that these cemeteries served. It has demonstrated that whilst most authors believe that cremation urns were manufactured for the funeral, there is no valid reason for believing that this was the case. Whilst a small number of scholars have argued that urns were probably re-used domestic vessels, the evidence that they cite in support of their arguments is also circumstantial. It has been argued that we will only understand the origins of cremation urns when we look beyond easily identified sooting patterns and begin to examine urns for much subtler evidence of pre-burial use. The use-alteration studies of Hally (1983), Arthur (2002; 2003) and Skibo (1992) provide us with a means by which to undertake such an analysis. Their methods are employed in the study of funerary and domestic pottery from North Lincolnshire and the results of this analysis are presented in Chapter 2.

This chapter has also introduced the idea that the form of pottery is directly related to function and as a consequence of the use-alteration analysis undertaken in this thesis, it has been argued that we must reconsider the way in which we study the forms of cremation urns. In particular, it was suggested that the functional properties of vessels should be placed at the heart of studies of early Anglo-Saxon vessel form. Therefore, Chapter 3 re-examines the form of cremation urns in light of the use-alteration evidence.

One of the major aims of this thesis is to shed light upon how burial was organised in the cemeteries of Elsham and Cleatham; for example, were people being buried in random locations within the cemeteries or in family and community groups? The study of stamp groups certainly suggests that at least some of the people in the early Anglo-Saxon period were being buried in family plots, but it is argued here that we need to look beyond the small number of vessels that have been attributed to stamp groups if we are to fully understand how burial was organised in cremation cemeteries. Richards (1987) has demonstrated that whilst the communities of early Anglo-Saxon England decorated their pottery according to the same design repertoire, there are regional preferences in the way that they employ and represent specific motifs. There is every reason to suspect that if regional preferences are apparent, then there should also be evidence of more localised preferences. Potters operating at one settlement, for example, might make extensive use of chevrons in their decorative schemes, whilst those at a neighbouring settlement might prefer to use standing arches. By considering the distribution of these different types of decoration within the cemeteries we might shed further light on the way that burial was organised. Chapter 4 therefore explores the way that decoration is applied to cremation runs, the frequencies with which different types of decoration occur in the cemeteries of Elsham and Cleatham, and the spatial distributions of types of decoration within the cemeteries.

Over recent years a number of authors have noticed patterns in the spatial distributions of specific ceramic fabric types, within both settlement and cemetery contexts. Paul Blinkhorn (1997) has argued that the preferential use of certain types of temper by potters is a consequence of their cultural traditions. In this chapter it has been suggested that by plotting the distributions of fabric across North Lincolnshire, and indeed within the cemeteries of Elsham and Cleatham, we might gain a better understanding of the ways in which pottery was produced in early the Anglo-Saxon period, but also how burial was organised in the cemeteries. Chapter 5, therefore, considers the distribution of ceramic fabric types, both within the individual study cemeteries and within North Lincolnshire itself.

A review of the evidence pertaining to the theory that cremation cemeteries acted as centralised depositories, serving a number of dispersed communities, has also been presented here. Whilst this reveals that there is a compelling body of evidence to support such claims, it was argued that we will never fully understand the extent of these catchment areas by simply plotting the locations of settlements and cemeteries on two dimensional maps. Instead, we require an empirical method that actually allows us to tie cemeteries to individual settlements. As early Anglo-Saxon pottery was made by individual households, using locally available materials, for their own consumption, it was suggested that a petrographic comparison of funerary and domestic pottery will allow the identification of possible source settlements for cremation urns. By plotting the location of such settlements in relation to the cemeteries, it will be possible to build up ceramic hinterlands around the cemeteries and thereby gain a greater understanding of the extent of individual cemetery's catchment areas. The results of such an analysis are presented in Chapter 5. Finally, and perhaps most importantly, this chapter introduced the cemeteries and the non-funerary sites that provide the assemblages that allow this study to take place.

Chapter 2

The Pre-Burial Origins of Cremation Urns: a Use-Alteration Approach

Introduction

It has been suggested that the elaborately decorated urns from the cremation cemeteries of early Anglo-Saxon England should be interpreted as a symbolic vocabulary, recording details about the ethnicity, age, gender, and status of the individual whose remains these vessels contained (Richards 1987). Yet, whether these urns were specially produced for burial or re-used domestic vessels has never been resolved, and discussions are often based on little more than circumstantial evidence. This chapter presents new insights into this debate by taking a *use-alteration* approach to the study of both cremation urns and pottery recovered from non-funerary sites, demonstrating that a wealth of information can be generated about the pre-burial biographies of individual vessels. It will firstly review the current arguments for funerary production and domestic re-use, before moving on to consider the range of use-alteration characteristics that we may hope to see on such vessels. The range of characteristics exhibited on urns from the cemeteries of Cleatham and Elsham, and the pottery from the 80 non-funerary pottery find-sites that surround these cemeteries, will be revealed and discussed. Finally, the often-noted practice of boring holes in the walls and bases of cremation urns will be considered in light of the use-alteration evidence.

Commissioned vessels or re-used domestic pots?

Over the last 70 years or so the prevailing belief amongst early medieval archaeologists has been that cremation urns were manufactured at the time of a funeral, with a specific 'client' in mind (Laing and Laing 1979, 77; Leahy 2007b, 54; Wilson 1965, 98; Richards 1987). Such views stem from the relative proportions of decorated pottery found in funerary and domestic contexts, observable correlations between the decoration and the cremated remains, and the apparent lack of evidence for pre-burial domestic use (Leahy 2007b, 55). In more recent years a small number of authors have advanced counter-arguments to the specialist funerary production hypothesis, citing the fact that the same forms, types of decoration and fabrics of pottery are found in both cemeteries and settlements as evidence that cremation urns were probably re-used domestic vessels (Hirst and Clark 2009, 603, 610; Mainman 2009, 590; Russel 1984, 520, 543). In Chapter 1, however, it was demonstrated that none of the evidence that is used as support for the two competing arguments actually sustains either hypothesis.

With these findings in mind it was argued that if we are ever to understand whether cremations urns were used prior to their burial, then we must focus solely on the evidence of use, and not be distracted by other forms of evidence (however tempting they might be). Of particular relevance to this work, then, are the use-alteration studies of David Hally (1983), James Skibo (1992) and John Arthur (2002; 2003), which illuminate the range of ways in which ceramic vessels may be used and the ensuing range of use-alteration characteristics that develop on their surfaces. Significantly, their studies demonstrate that sooting deposits (which are relied upon by early Anglo-Saxon archaeologists as a means of identifying pre-burial use) are not the only physical indication of use; there are additional surface attributes that may reveal the domestic functions of pots.

Use-Alteration of Ceramic Vessels

Use-alteration of pottery is defined as 'the chemical or physical changes that occur to the surface or subsurface of ceramics as a result of use' (Skibo 1992, 45). Uses may include cooking, roasting, storage, or cleaning, and the extent to which these uses result in alteration depends upon the contents of the vessel, duration and frequency of use, the user, the actions of use, and the chemical and physical properties of the vessel (Skibo 1992, 46-7). Resultant changes may include the build up of soot deposits, absorption of phosphorous and fatty acids, accumulation of mineral salts within the ceramic fabric, and the discolouration and breakdown of a vessel's surface, also known as *surface attrition* (Hally 1983, 4; Skibo 1992, 106); it is the latter transformation that is the focus of this chapter.

Surface attrition is defined as the 'removal or deformation of ceramic surfaces' and it can result from a variety of abrasive and non-abrasive processes (Skibo 1992, 106). Abrasive processes are those which involve mechanical contact, such as sliding, scraping, and striking, whilst non-abrasive actions include thermal spalling, salt erosion, and internal pitting as a consequence of chemical corrosion (Arnold 2002; 2003; Hally 1983, 18-19; O'Brien 1990; Skibo 1992, 106-7). As will be demonstrated, despite some of these forms of use-alteration being observable on Anglo-Saxon cremation urns they have been largely ignored. In order to develop an appreciation of how these types of attrition develop and manifest themselves, two ethnographic case studies are now presented.

Abrasive Attrition: Kalinga Pottery from the Philippines

The Kalinga live in Cordillera Central on the Philippine island of Luzon (Skibo 1992, 54). Their pots are globular, coil built and fired in bonfires. Temperatures in these fires rarely exceed 700^{o}C. Pots are made from a range of clays and in their natural state they contain sufficient non-plastics to require that no additional temper is added. Prior to firing the interior and exterior surfaces of the leather-hard pot are polished with a stone, leaving them smooth to the touch, and although inclusions are visible in the surface they do not protrude from the wall (Skibo 1992, 60-1, 112). Skibo (1992, 113-4) identified ten locations on the interior and exterior surfaces of Kalinga cooking vessels that exhibit use-alteration characteristics. It is the exterior base that proves most fruitful in attempting to identify the pre-burial use of Anglo-Saxon cremation urns and consequently only characteristics identified on the bases of the Kalinga vessels are considered here.

All Kalinga cooking vessels have a circular 3-6cm abrasive patch on their base; extensively used pots possess an additional peripheral zone around this patch. The use-alteration characteristics observable in this patch are pedestalled temper, pits, and scratches. Pedestalled temper results from the gentle abrasion of the ceramic paste, between and around temper particles in the vessel's surface, and as a consequence the particles stand proud of the surface (Figure 2.1). For abrasion to take place the diameter of the abrader must be smaller than the space between temper particles, so that it is able to get amongst them and remove the paste. The turning and tipping of vessels during serving, on a granular textured hearth floor, are responsible for this attritional characteristic on Kalinga pots.

If a pedestalled temper particle is impacted upon by an abrader then it may be removed from the surface of the ceramic; this leaves a pit. Pits may also develop when an abrader impacts with the surface of the ceramic, resulting in a small amount of the clay paste being removed; the pit then takes the form of a small chip, nick or gouge (Figure 2.1). Particles in the hearth floor which impact with the vessel when it is set down cause such attrition. Scratches are the final use-alteration characteristic noted in the basal patch (Figure 2.1). These are the result of an abrader being drawn across a vessel's surface. Abraders on the surface of the hearth or floor score the base of the vessel when the pot is being dragged across the surface when food is being served (Skibo 1992, 113-17).

Figure 2.1: Abrasive attrition on the bases of Kalinga cooking pots**:** (pedestalled temper (top; width of image c. 3mm); pits (centre; width of image c. 13mm): scratches (bottom; width of image c. 3mm) (Skibo 1992, Figures 6.3-6.5).

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Figure 2.2: Non-abrasive attrition on the internal surfaces of Gamo storage vessels**.** Internal pitting of a large jar caused by the storage of beer (top). Internal pitting of a serving and storage vessel (bottom) (Arthur 2002 Figure 4; 2003 Plate 3).

Non-Abrasive Attrition: The Gamo, South-Western Ethiopia

Like the Kalinga, the Gamo of south-western Ethiopia produce low-fired ceramics. They manufacture their pottery from a range of clays and tempers and once formed vessels are decorated, dried, pre-fired and then fired in an open fire. After firing, the vessels are coated in *etema*, a liquid deriving from the indigenous enset plant (Arthur 2002, 332-4). Arthur examined 1058 Gamo food-processing vessels, and, intriguingly, 276 (26.1%) of these exhibited a specific type of attrition seen only on the internal surface (Arthur 2002, 339). The attrition took the form of erosional pitting and exfoliating spalls, occurred randomly from the base through maximum diameter and upper body, and even resulted in the complete erosion of the interior wall (Arthur 2002, 337-9, Figures 4, 5 and 7; 2003, 524, Plate. 3). In addition to food processing vessels, Arthur examined a further 63 beer production pots; all exhibited this type of attrition (Arthur 2003, 524) (Figure 2.2).

In order to gain an understanding of how these exfoliations developed Arthur explored the food and drink processing activities in which the vessels partook. Of the 276 food preparation vessels, 5.8% were used for enset (an indigenous Ethiopian plant with fibrous leaves and edible roots) and potatoes, whilst the remaining 94.2% were involved in the processing of grains and dairy products (Arthur 2002, 335, 339, 347; 2003, 524). In the context of the present study, it is worth exploring further the process involved in each of these activities. The Gamo prepare enset by boiling its corms with potatoes, onions, garlic or cabbage; alternatively they may ferment it. The fermentation process involves burying the enset, or placing it in a large storage bowl for seven days. It is then removed, trampled underfoot and stored for a further seven days. The fermented enset is subsequently baked into bread or cooked with a range of grains (Arthur 2002, 335-6). Severe internal pitting was also noted on all vessels used in the preparation of the high-status foodstuff known as Gordo, which is made by mixing milk with ground barley and boiling the mixture in a narrow-mouthed jar (Arthur 2002, 346). Pitting was also noted on vessels involved in the production of butter. In butter-making milk is left to stand for a week in a large storage jar, during which time the curds separate from the whey. The curd is removed and placed into a storage jar, the mouth of which is sealed by an enset leaf (Arthur 2002, 336-7). Finally, Arthur noted that all vessels used in the production and consumption of beer (even drinking cups) were severely pitted. Beer is manufactured by one of two methods, both of which begin by grinding grains such as barley, wheat or maize into flour. The highland Gamo place the flour into a large serving bowl then boil water in a large cooking jar and pour this over the flour. The mixture is left to cool before being transferred into a beer jar to ferment for five days. In the lowland areas the flour and water are boiled together, but again the mixture is left to ferment in beer jars for five days (Arthur 2002, 337, 349; 2003, 519).

Given that various food-production processes result in pitting, one possible explanation for the attrition on these pots might be the properties of the vessels themselves. Arthur (2002, 334; 2003, 524) has observed, however, that pitting is seen on vessels manufactured using the full range of the communities' clay and temper types, with all surface and post-firing treatments, and fired using all fuel-woods. Thus, the remaining common feature that links all pitted vessels is that the foodstuffs processed in them all have the ability to ferment (Arthur 2002, 339); indeed in most cases it is the process of fermentation that produce the desired product. Significantly, the bacteria involved in the fermentation of dairy, grains, beer and enset all produce lactic acid and, in fact, these bacteria are imperative to the production of the foodstuffs (Arthur 2002, 337-9; 2003, 524). Lactic acid-producing bacteria are widely distributed throughout spontaneous fermentations; they are present throughout the beer fermentation process, and without them the yeasts would not produce alcohol (this is because yeasts only produce alcohol if they are forced to respire in anaerobic and acidic conditions – it is the lactic acid-causing bacteria that are responsible for producing these acidic conditions). In dairying processes it is the release of this acid by *lactoccocus lactis* which causes the coagulation of milk proteins and the subsequent separation of milk into curds and whey (Campbell 2003, 1-3; Dietler and Herbich 2006, 402; Fox and McSweeney 2004, 1-2; Lowe and Arendt 2004, 163). It is the release of this acid, by fermenting produce, that results in a lowering of the pH and subsequent erosion of the internal surfaces of Gamo pottery (Arthur 2002, 337-9; 2003, 524).

These ethnographic examples demonstrate that, even in the absence of sooting deposits, there are a number of alternative ways in which one can recognise that pots have been used. The identification of use-alteration characteristics on archaeological ceramics might, therefore, afford us some insight into how pottery was used in the early Anglo-Saxon period. In particular, a use-alteration study of cremation urns might well go some way to answering the question whether urns served some domestic function prior to their burial or whether they were produced for the funeral; it is with this in mind that we move to the next section of this chapter.

The Use-Alteration of Anglo-Saxon Pottery

The urns from the cemeteries of Cleatham and Elsham and all sherds from each of the 80 pottery find-sites were examined for use-alteration characteristics. At Cleatham Leahy reported that the excavations revealed 1204 cremations; however, analysis of the skeletal remains demonstrates that just 969 vessels were positively associated with burnt human bone (Kirsty Squires pers. comm.). Thus, in order to ensure that each vessel considered was indeed a cremation urn, only those vessels with associated cremated remains were considered. A small number were unavailable for study, due to being held in other museums around the country (for example, the British Museum and Lincoln Museum; Leahy 2007a, 2), therefore a total of 958 (99%) of the Cleatham urns were examined. Similarly, although 625 urns were reported from Elsham, analysis of the cremated remains demonstrates that only 504 urns were directly associated with human remains (Kirsty Squires pers. comm.); again only those urns associated with burnt human remains were considered.

Figures 2.3 to 2.6 show examples of various stages of abrasive attrition on the exterior bases of a number of the Cleatham urns. Pedestalled temper, small chips, nicks and gouges are clearly evident on the well-abraded base and basal angle of urn 230 (Figure 2.3). A similar, if less developed, pattern of abrasion is noted on urn 957 (Figure. 2.4) and accordingly, as abrasion is seen to be most severe along the basal angels of these vessels, it can be suggested that they have frequently been tipped, rotated and dragged along on their basal angles. A developing abrasive patch appears on the basal angle of urn 552 (Figure 2.5); here pedestalled temper and pits where temper has been removed are clearly identifiable. Finally, Figure 2.6 details an abraded patch on the base of urn 316, a globular vessel. The same type of attrition was identified on urns from Elsham and pottery from the non-funerary find sites (Figures 2.7 and 2.8).

Amongst the Gamo, Arthur (2002, 337-9) noted that attrition resulting from fermentation processes was confined to the interior surface of vessels and that the location of this internal attrition was apparently random; this is certainly the case with urns from both Elsham and Cleatham, and the pots from the 80 pottery find sites. For example, large areas of the internal surface of Cleatham Urn 316 (Figure 2.9) have been removed, whilst other portions of the same pot remain unaffected. The random nature and developmental stages of this type of attrition are evidenced by the internal surface of Cleatham urn 168 (Figure 2.10). Spalls and exfoliations are well developed on the lower, upper, and internal neck regions of Cleatham urn 544 but almost absent from the mid interior (Figure 2.11). The entire internal wall of Cleatham urn 562 (Figure 2.12) has eroded, and urn EL76PW (Figure 2.13) demonstrates that the same attritional markers are present on vessels from Elsham. Finally, Figure 2.15 details the attrition seen on the internal surfaces of pottery from the non-funerary find site of Manton Warren (MTBX); this confirms that this form of use-alteration is not restricted to funerary vessels.

Before accepting that such examples provide conclusive evidence that Anglo-Saxon cremation urns were involved in food and drink processing activities we must exclude the possibility that post-depositional or post-excavation processes are the cause of the observed alteration. In this respect, it is notable that pedestalled temper and pits are generally confined to the exterior base. If these characteristics were the result of post-depositional taphonomic processes, we would expect to see similar levels of attrition on all surfaces. Post-excavation washing of pottery, especially scrubbing with a toothbrush, can be an abrasive process, but if this were the cause of abrasion it would presumably not be limited to the base. Moreover, the survival of soil *inside* pits and nicks demonstrates that attrition was not the result of post-excavation treatment, as it would be difficult to account for soil build-up during or after washing (Figures 2.3-2.7). In sum, the identification of abrasive attrition on the bases of both cremation urns and domestic vessels does not allow us to see specific uses of these pots, but it *does* allow us to recognise vessels that had been frequently lifted, set down, tipped, dragged and rotated – and hence used – prior to burial.

With respect to non-abrasive attrition, it could be argued that the interior surfaces of vessels eroded as a result of prolonged contact with cremated remains. However, this attrition was also noted on inhumation accessory vessels and on pottery recovered from the non-funerary find sites, neither of which contained cremated remains; this explanation must, therefore, also be discounted (Figures 2.14 and 2.15). Moreover, as Figures 2.9 to 2.15 demonstrate, soil sometimes adheres to the roughened interior surface of the exfoliations, suggesting that the urns had developed these attritional markers *before* burial. Interestingly, it appears that the pitting in the lower walls of these urns tends to be less well-coated with soil than the upper and neck interiors and it seems likely that this shows us the depth of cremated remains, the cremains acting as a barrier between the soil and the eroded surface (particularly Figures 2.11 and 2.12). Again, we cannot say for certain what these pots were used for, but the identification of such use-alteration characteristics allows us to recognise instances of pre-burial use of individual cremation urns. Crucially, the ethnographic parallels discussed above strongly hint that they were involved in processes in which fermentation took place.

Figure 2.3: Abrasive attrition on the base and basal angle of Cleatham urn 230.

Figure 2.4: Abrasive attrition on the base and basal angle of Cleatham urn 957.

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Figure 2.5: Abrasive attrition on the base and basal angle of Cleatham urn 552. The detail of the basal angle (bottom) is at the 6 o'clock position on the base (above).

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Figure 2.6: Abrasive attrition on Cleatham urn 316. Note the contrast between the unabraded exterior wall of the vessel (right) and the abraded base (left).

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Figure 2.7: Abrasive attrition on the base Elsham urn 230.EL76MY. Contrast the abraded base (left) with the un-abraded exterior wall of the urn (right).

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Figure 2.8: Abrasive attrition on the basal angle of a vessel recovered from the non-funerary find-site of Caistor (CAAG).

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Figure 2.9: Non-abrasive attrition of the internal surface of Cleatham urn 316. Contrast the condition of the external surfaces of this vessel (Figure 2.6) and Figure 2.2, which shows the non-abrasive attrition that developed as result of lactic acid fermentations taking place in Gamo pottery vessels.

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Figure 2.10: Non-abrasive attrition on Cleatham urn 168. Note the apparently random location of the attrition on this urn's internal surface, and how the attrition develops from small exfoliations and pits to large areas of missing surface.

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Figure 2.11: Cleatham urn 544. Contrast the unaltered burnished outer surface (top right) with the pitting that has developed on the inner surfaces (top left and bottom). Also note the random locations of the internal pitting and that pitting in the upper half of the vessel (bottom) is well coated with soil, but that the lower surfaces are clearer (top left).

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Figure 2.12: Non-abrasive attrition of Cleatham urn 526. Note that the entire internal surface of this urn has been eroded. The hole in the lower wall is a post-firing perforation.

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Figure 2.13: Non-abrasive attrition of Elsham urn EL75NT.

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Figure 2.14: Non-abrasive attrition on the internal surface of an inhumation accessory vessel from Grave 29 at Cleatham.

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Figure 2.15: External (top) and internal (bottom) surfaces of a vessel from a non-funerary find site at Manton Warren (MTBX). Contrast the smoothed exterior surface and the completely eroded internal surface.

Quantification and Interpretation

The Cemeteries

Having identified these use-alteration characteristics we must now consider them cumulatively and alongside the previously identified sooted vessels, discussed in Chapter 1. It should be noted that the author has considered instances of both primary and secondary sooting deposits as advocated by Hally (1983, 8). This has considerably increased the number of Cleatham urns identified as possessing sooting deposits (Leahy identified 3%, this study recognises 7%). Vessels whose internal surfaces have been leached have also been considered; leaching, or decalcification of calcareous inclusions, is considered to be another signifier of use as it indicates that a vessel held a slightly acidic substance (Miles *et al*. 1989, 208). Figure 2.16 identifies both the individual and total number of instances of alteration on urns from Cleatham. From the 958 Cleatham urns examined, internal pitting was the most common form of use-alteration (265 instances, 28%), followed by basal abrasion (236 instances, 25%), sooting (70 instances, 7%), and finally leaching (37 instances, 4%). Significantly a total of 488 (51%) pots exhibit use-alteration characteristics, which is considerably more than the 2-3% previously identified by sooting deposits alone. However, since basal abrasion cannot be identified if an urn's base is missing, and partial survival of urns inhibits the identification of randomly occurring internal pits and exfoliations, one must appreciate that these results do not present the full picture of attrition. In order to gain a fuller understanding of the levels of attrition only the complete Cleatham urns (n=116) were considered (including those that were excavated undamaged and those that were smashed but wholly re-constructible). With 60 (52%) cases, basal abrasion is now the most common form of attrition, followed by internal pitting (36 instances, 31%), sooting (9 instances, 8%) and finally, leaching (2, instances, 2%). Of greatest significance here is the total number of pots now exhibiting signs of re-use; 71% (82 vessels) show signs of having been *used prior* to burial (Figure 2.17).

The use-alteration analysis of the 504 Elsham urns which contained cremated remains revealed similar levels of attrition to those observed on the Cleatham assemblage (Figure 2.18). However, due to the level of urn preservation we must again consider that these proportions are not a true reflection of the extent of attrition. As with the Cleatham assemblage, to gain a fuller understanding of the levels of attrition the emphasis was placed on complete urns (Figure 2.19). When compared to Cleatham, we see that although there are slight differences in the proportions of each type of use-alteration – for example, 24% of the Elsham urns were internally pitted but 31% at Cleatham – the overall attritional patterns are the same. Basal abrasion is most common, followed by internal pitting, and finally sooting (no internal leaching was noted on the complete vessels, but as leaching was noted on eleven of the 504 urn, this is simply a result of the small sample size). Just like Cleatham, 71% of the complete Elsham urns show signs of having being used prior to their burial.

There is, then, evidence that a large proportion of these vessels at both Elsham and Cleatham were used in specialist processes, such as fermentation. Given that many were decorated, and that decorated vessels in cemeteries vastly outnumber those in the settlements, is it possible that decoration was somehow linked to these processes? In order to test such a hypothesis the relationships between each type of attrition and decoration among the 116 and 95 complete Cleatham and Elsham urns were considered (Figures 2.20). In both cases this demonstrated that internal pitting was most common on decorated vessels, whilst sooting was most common on undecorated vessels (Figure 2.21). Chi-squared tests for independence were employed to determine whether these relationships were statistically significant. Unfortunately, the Elsham sample was not large enough to obtain statistically meaningful results, however the Cleatham analysis demonstrated that both relationships were in fact statistically significant (Chi-squared tests with Yates Continuity Correction for internal pitting and the presence of decoration $\chi^2 = 3.8$, $p = 0.05$ and sooting and the presence of decoration $\chi^2 = 9.7$, $p = 0.02$). Clearly, the presence of decoration is directly related to the pre-burial function.

Although leaching is a minor contributor to the overall level of use-alteration, at Cleatham leaching was seen to be biased towards decorated vessels. The significance of this relationship was also tested using the Chi-squared test for independence, but the small number of leached urns meant that the sample size was too small to obtain meaningful results. Basal abrasion was noted on 50% of Cleatham's complete decorated urns and 58% of the plain vessels, whilst at Elsham the levels were 65% and 75% respectively. This was not unexpected; while certain attritional markers derive from very specific processes (e.g. fermentation), basal abrasion is likely to affect most, if not all, vessels that were used prior to their burial, because all forms of use are likely to involve a vessel being set down on the base. Thus, we would expect to see similar proportions of basal attrition on both plain and decorated urns.

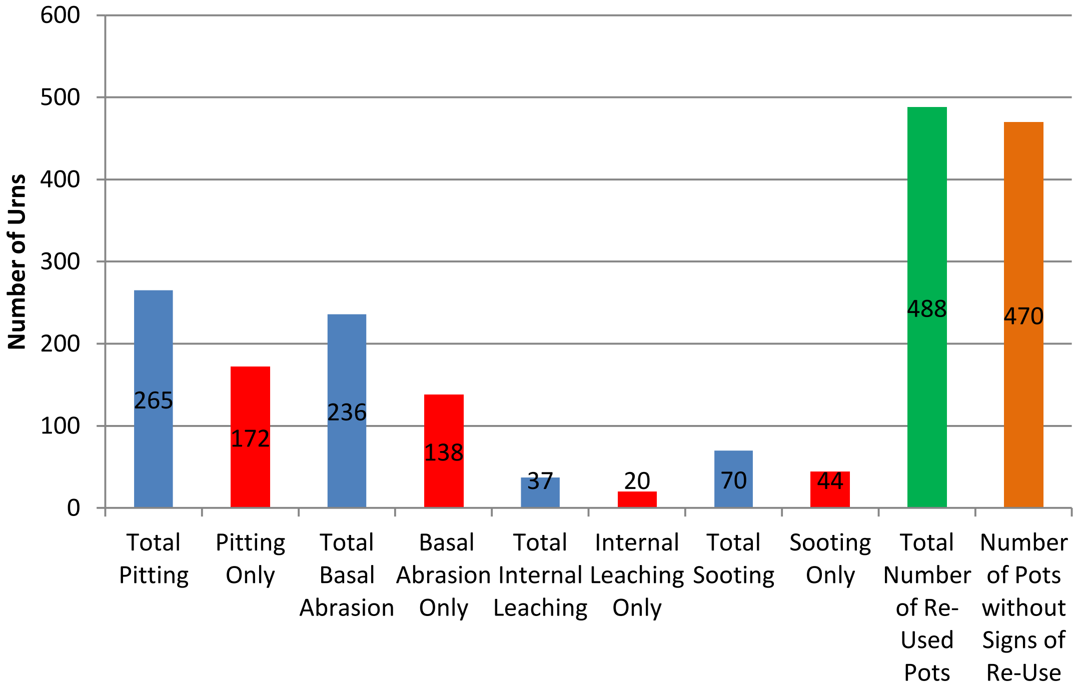


Figure 2.16: Frequency of use-alteration characteristics on all Cleatham urns that contained cremated human remains (n=958).

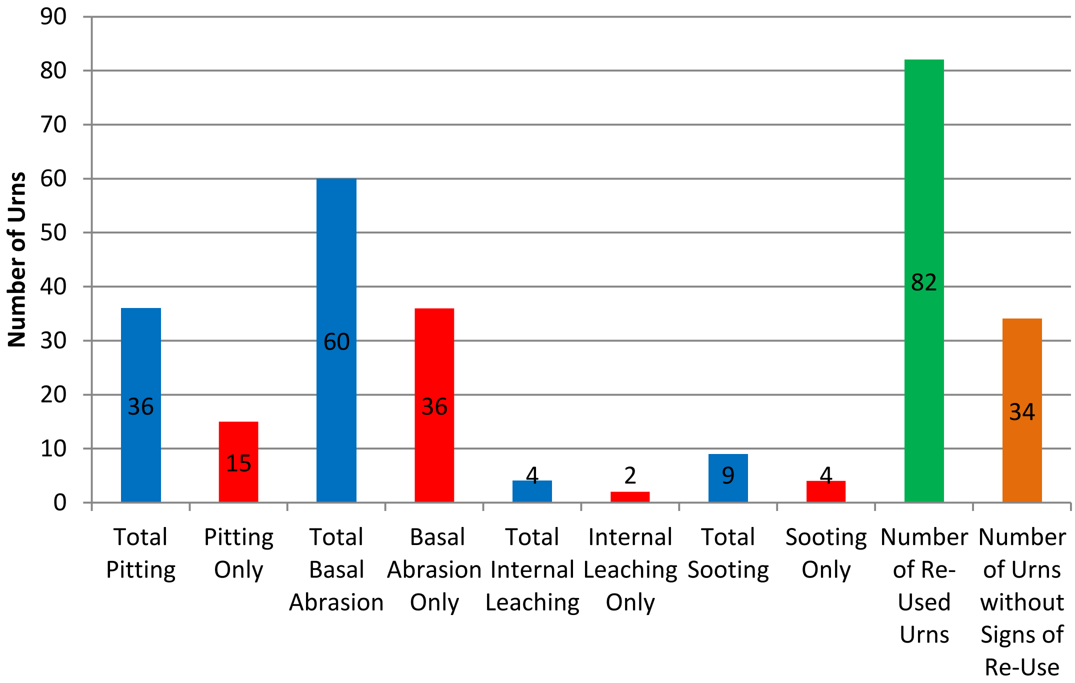


Figure 2.17: Frequency of use-alteration characteristics on all complete Cleatham urns that contained cremated human remains (n=116).

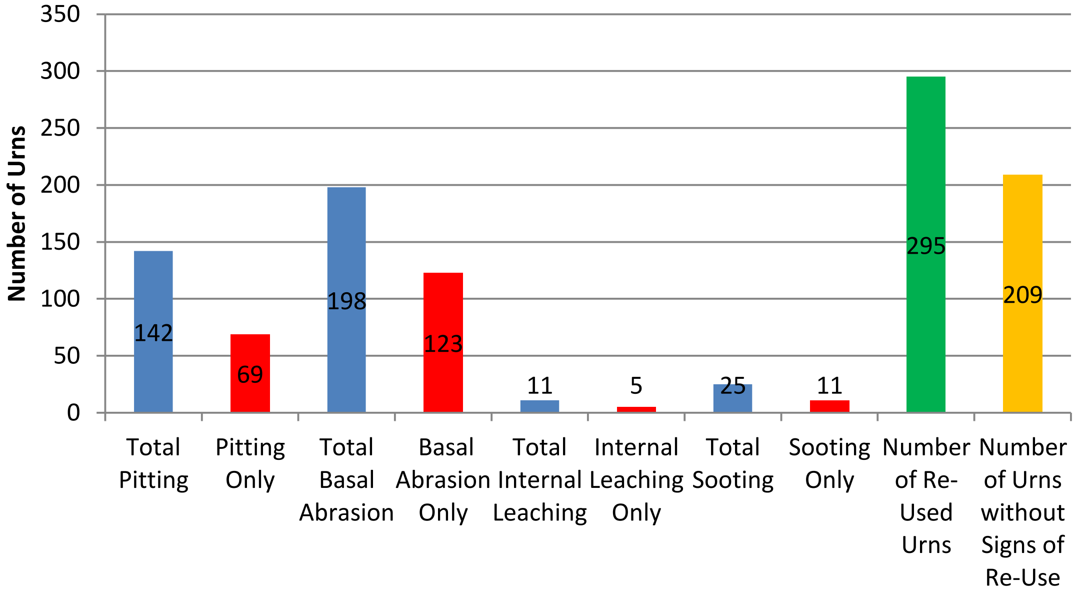


Figure 2.18: Frequency of use-alteration characteristics on all Elsham urns that contained cremated human remains (n=504).

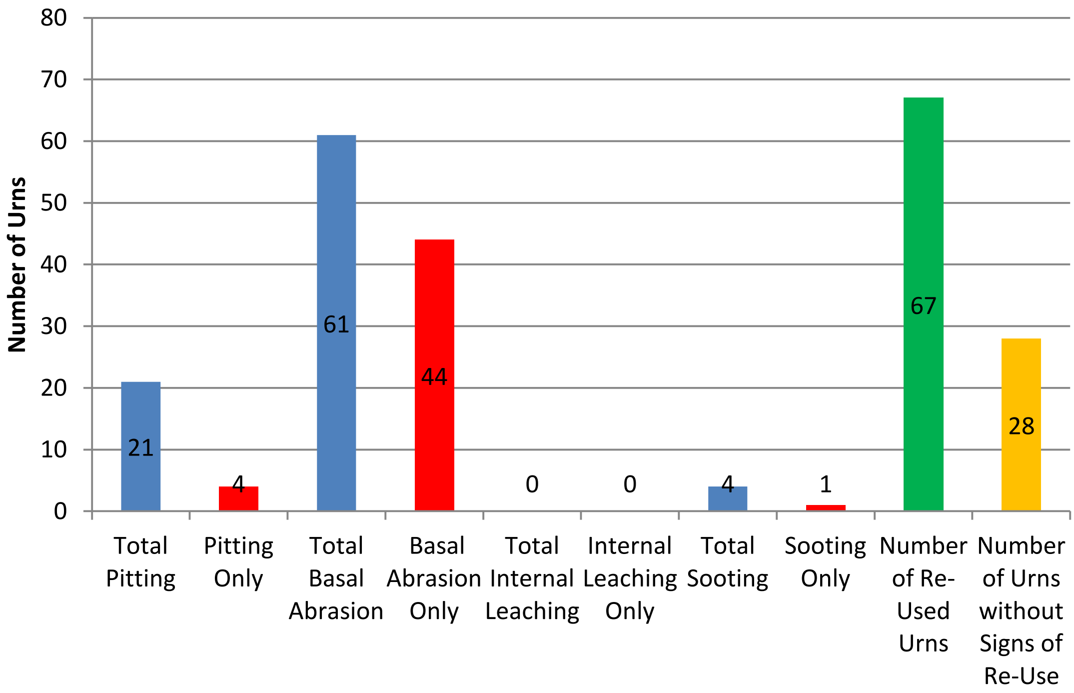


Figure 2.19: Frequency of use-alteration characteristics on all complete Elsham urns that contained cremated human remains (n=95).

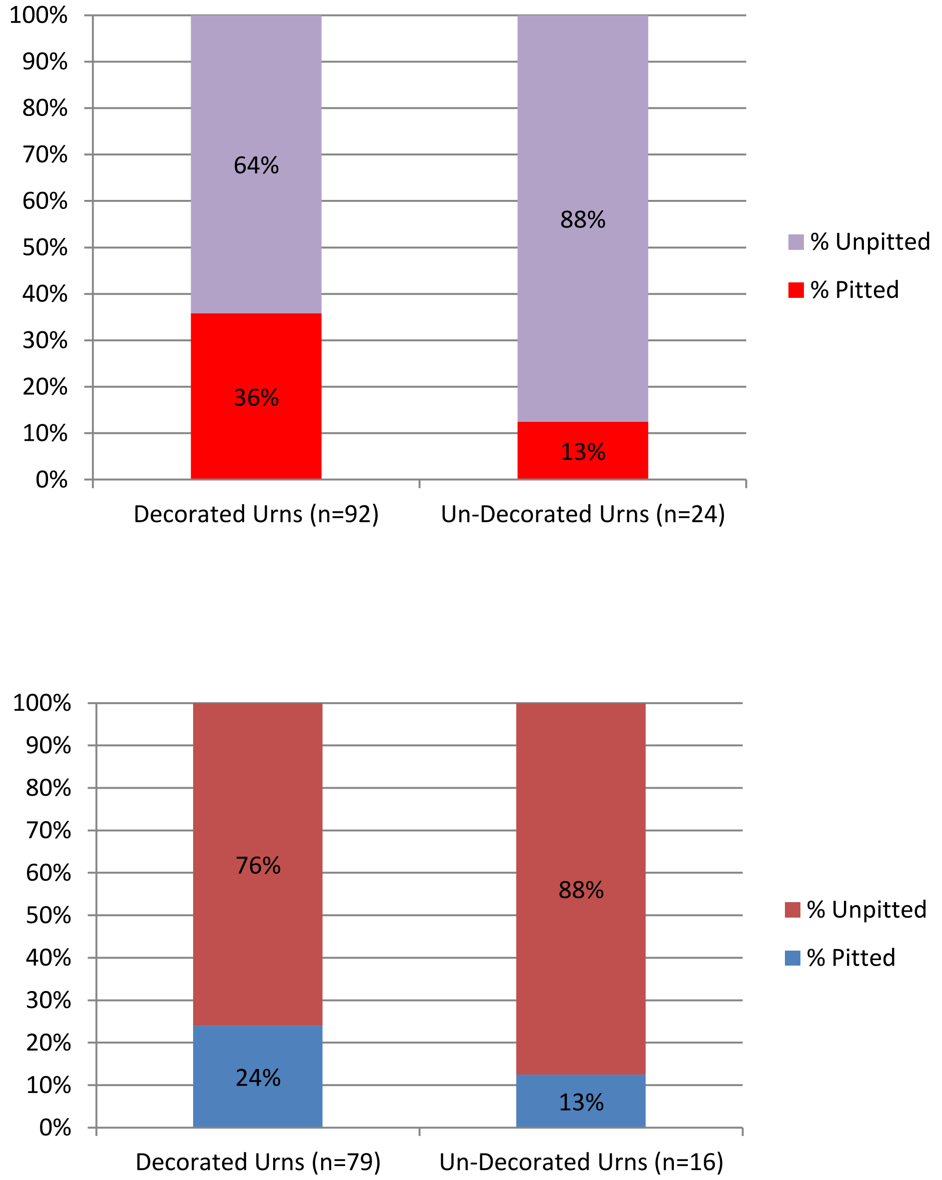
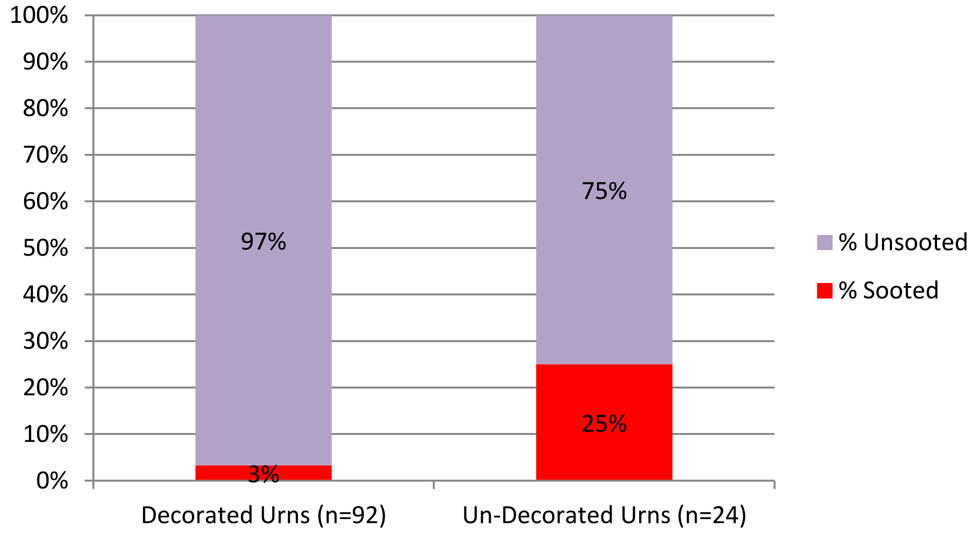


Figure 2.20 Relative proportions of internal pitting with respect to the presence/absence of decoration on all complete urns from Cleatham (n=116) (top) and Elsham (n=95) (bottom).



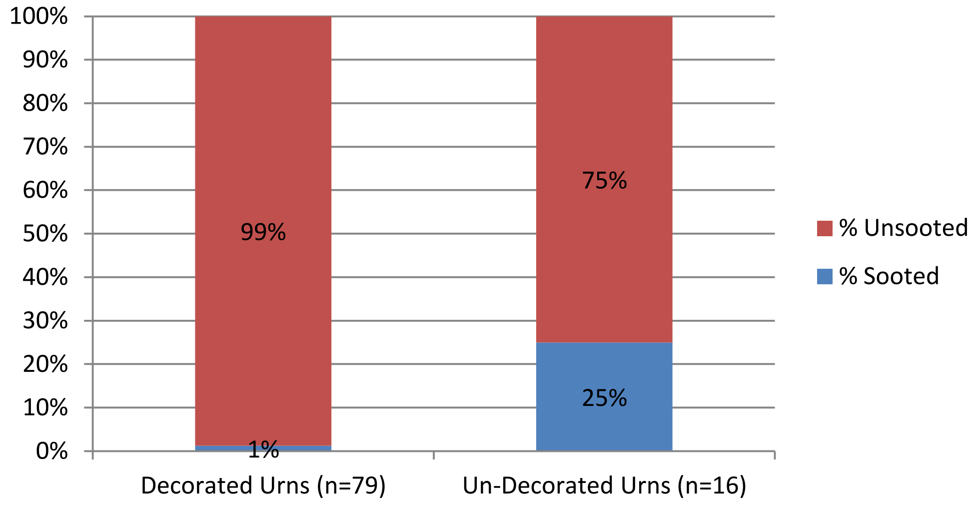


Figure 2.21: Relative proportions of soot deposits with respect to the presence/absence of decoration on all complete urns from Cleatham (n=116) (top) and Elsham (n=95) (bottom).

The Non-Funerary Pottery Find-Sites

The range of use-alteration characteristics noted at the cemeteries of Elsham and Cleatham were also seen on pottery recovered from the non-funerary find sites (Figures 2.8 and 2.15). Despite this, the frequencies in which each of the types of use-alteration occur differ considerably to those obtained from the cemeteries of Cleatham and Elsham. In this instance we see that sooting is the most common form of use-alteration, followed by internal pitting, basal abrasion and then finally leaching. It is worth exploring the reasons behind these differences.

The most commonly recognised mode of use-alteration identified on the non-funerary pottery was sooting. Indeed, 23% (407) of non-funerary vessels were sooted; this is considerably more than the 5% and 7% previously identified at Elsham and Cleatham respectively. Of the 407 sooted non-funerary vessels, only four were decorated, and these findings are in complete agreement with the cemetery results, which demonstrated that sooting is largely restricted to plain vessels (a Chi-squared test with Yates Continuity Correction demonstrates this to be a statistically significant relationship: $\chi^2 = 17.3$, $p < 0.000$).

Only 266 basal fragments were identified amongst the non-funerary pottery assemblages. Of these, 38% possessed abrasion indicators such as pits, pedestalled temper and scratches. Although the frequency of abrasion in this assemblage is less than on the bases of urns from Elsham and Cleatham, this difference is accounted for by the highly fragmentary nature of the non-funerary assemblage. As Figures 2.3 to 2.8 demonstrate, abrasion rarely manifests on the entire basal area. As complete bases were not recovered from the non-funerary sites, in contrast to the cremation sites, our ability to identify this form of attrition is considerably inhibited.

Only 7% of non-funerary vessels were identified as being internally pitted; this is considerably less than the proportion of internally pitted vessels in the cemetery assemblages. In agreement with the observations made in the analysis of the cemetery material, at the non-funerary sites internal pitting was more commonly noted on decorated vessels than on undercoated vessels. Indeed, 7.2% of decorated vessels were internally pitted, whilst 5.4% of plain vessels displayed pitting internally (although it should be noted that a Chi-squared test for independence demonstrates that this is not a statistically significant relationship). This small proportion of internally pitted vessels is probably due to the fact that decorated vessels are more commonly pitted than undecorated ones; since decorated pottery is under-represented in settlement assemblages, the same will be true of internal pitting.

One of the major insights to emerge from Richards's (1987) survey of cremation urns was that there were regional differences in both the way that pottery was decorated and in the types of grave good that were included in cremation urns. One might question, then, whether the identification of use-alteration characteristics on urns from North Lincolnshire is a region-specific phenomenon? Alternatively, is it a characteristic that occurs across Anglo-Saxon England, but one that has not been noticed previously, or whose significance has not been recognised? It seems that this latter suggestion is the case. For instance, recording of the surface conditions of cremation urns from the cemetery of Millgate (Newark-on-Trent) was sporadic (for some urns only the outside surface is described, for others the conditions of both surfaces are detailed, whilst in others urn descriptions do not even mention the surface condition), yet some of the urns at this cemetery clearly suffered from the same types of attrition noted on the Cleatham and Elsham urns. For example, Gavin Kinsley (1989, 56-8) recorded that whilst the outside surface of the decorated urn 265 was 'smoothed to lightly burnished', on the inside the 'entire surface [was] missing'. The same was true of urn 262; in fact, the attrition on the internal surface of this urn was so advanced that the illustrator saw fit to represent this in the line drawing of the urn. In addition to internal pitting, Kinsley also commented on the condition of bases; he recorded that on urn 286 the base was 'markedly rougher than the other surfaces, with a clear change of finish along the basal angle' (Kinsley 1989, 56-8).

Similarly, whilst the condition of the external surfaces of urns is presented in the recently published report on the urns from Mucking, no comment is made on the condition of their internal surfaces (Hirst and Clark 2009). This is extremely unfortunate, particularly because, in the report on the pottery from the adjacent *settlement* of Mucking, Hamerow describes the condition of the internal and external surfaces of vessels. In the latter, we find comments such as 'exterior, carefully smoothed, then lightly burnished; black interior, smoothed and flaking' (GH 103) (Hamerow 1993, 143, and Figure 138). In light of this evidence, it is clear that the types of attrition noted on the pottery from Cleatham, Elsham, and the non-funerary sites that surround them are not a region-specific phenomenon. However, until scholars begin to look for these types of attrition and systematically and consistently record the conditions of vessel surfaces, there is little chance that we will fully understand the extent of the use-alteration phenomenon in early Anglo-Saxon England.[1]

Made for the Funeral or Reused Domestic Pottery?

The observable attritional markers discussed in this chapter reveal that a considerable number of cremation urns from Cleatham and Elsham were involved in food or drink processing activities prior to their burial, and that their decoration was directly linked to these activities. It is unclear, however, whether this attrition developed as a result of day-to-day use or from shorter term activities, such as funerary feasting; the following discussion considers these possibilities.

As the levels of attrition span the entire spectrum, from no attrition to complete internal erosion and heavy basal abrasion, it would not seem unreasonable to suggest that the severity of attrition could be used as an indicator of vessel age and thus help us to determine whether pots were produced for the funeral. Unfortunately, such a method of aging is unfeasible; indeed, severely pitted Gamo beer vessels vary in age from just one month, in households where beer production is continuous, to an alleged 125 years in households where it is rare (Arthur 2002, 348). This suggests that it is as likely that the internal attrition on early Anglo-Saxon urns developed as a result of intense production of foodstuffs for funerary feasting as it is that it developed from low frequency, long-term domestic use. Some consideration of the time between death, cremation and burial could, therefore, help to resolve this problem.

Ethnographic accounts of cremation suggest that the time between death, cremation and burial is often relatively short and generally no more than a few days (see for example Gurdon, 1914, 132-4; ManiBabu 1994, 157-161; Vitebsky 1993, 49). Whilst there are a number of historical and ethnographic accounts that demonstrate considerable time between death and cremation, such examples generally derive from sources documenting high-status funerals and consequently they are ‘probably considerably more elaborate than those afforded to lesser mortals, who constitute the bulk of archaeological cremations’ (McKinley 1994, 79). We cannot say for certain whether the time between death, cremation, and burial in early Anglo-Saxon England was relatively short. However, we do know that corpses were placed on the pyre

[1] Internal pitting does not only occur on early Anglo-Saxon pottery. Indeed, this form of attrition is seen on late Anglo-Saxon Thetford-ware pitchers (Jane Young and Paul Blinkhorn pers. comm.), late Anglo-Saxon Michelmersh-ware pitchers (Ben Jervis pers. comm.) and Roman Horningsea ware (Ian Rowlandson pers. comm.). I am indebted to these scholars for bringing these examples to my attention.

‘whole and articulated’; that is to say they had not been de-fleshed, and that there is no evidence to suggest that they had been ‘treated’ in any way prior to their cremation (McKinley 1994, 86). We also know that after cremation the remains were deliberately and carefully collected, perhaps washed, and then placed into an urn. Although it is not possible to ascertain how much time passed between collection and deposition, there is no ‘ethnographic or anthropological evidence to suggest that remains were kept above ground for longer than a few days after cremation’ (McKinley 1994, 85-6, 102, 119).

Such evidence suggests that a relatively short time between death and burial is not an unrealistic prospect and in this situation it is unlikely that there would have been sufficient time for the severe levels of both internal and external attrition seen on some of the urns to develop. Indeed, ethnographic and historical accounts of the brewing of un-hopped beverages (hops were not introduced to England until c. AD 1400; see Chapter 3), for example, demonstrate that the process normally takes two to eight days. As these un-hopped drinks have poor keeping qualities they have to be consumed within a few days of manufacture. We can suggest, then, that if urns were being made for the funeral – and that there were only a few days between death, cremation and burial – it would only be possible to undertake a handful of brews in these vessels before they were buried (see Chapter 3, and also Clark 1983, 24; Corran 1975, 42-4; Stone 2006, 16). As such, unless the Anglo-Saxons were manufacturing lactic acid-fermented produce with a pH similar to that of battery acid, and intentionally abrading the bases of their vessels, it seems extremely unlikely that the levels of attrition seen on some of these urns would have had time to develop if they had been made for the funeral. The suggestion that cremation urns were in fact re-used domestic vessels is given further credence when the evidence from settlement sites is taken into consideration. Indeed, 7% of the vessels from the non-funerary find sites were internally pitted and were thus involved in the same fermentational processes as the urns. As such, there is no apparent difference in the way that domestic pottery and funerary pottery was used prior to its incorporation into the archaeological record, and there is a very real possibility that cremation urns were obtained from the domestic sphere.

It has been shown here that urn decoration was related to pre-burial function and, indeed, at both cemetery and non-funerary find-sites internal pitting occurred more frequently on decorated than undecorated vessels, whilst sooting occurred more frequently on plain vessels. Whilst the sample size of the Elsham assemblage was too small to test this relationship statistically, at Cleatham, a Chi-squared test for independence demonstrated that was a statistically significant result. Even so, it is clear that the use-decoration relationship is not clear cut and there are a small number of plain vessels that do posses internal pitting (Figure 2.20). However, these 'anomalies' are more easily understood if we consider the possibility that it was the *role* of the pot in specific domestic activities that determined its suitability as an appropriate vessel to contain the remains of the dead (see Chapter 6). The production and consumption of fermented food and drink is a multi-stage, multi-vessel process (see the discussion of Gamo beer production, above, and for a more detailed appraisal see Chapter 3). The situation was more than likely the same in Anglo-Saxon England, with decorated and plain jars being just one of a number of pots being used in fermentation procedures; this would certainly account for the appearance of internal pitting on plain vessels. Alternatively, it may be that the 'expected' function of a pot is not always fulfilled – to take brewing as an example, the Gamo and Luo (Kenya) often produce beer not in specified 'beer' jars, but in large storage jars or cooking pots (Arthur 2002, 347; Dietler and Herbich 2006, 399). In Anglo-Saxon England, it is quite possible that if a decorated pot was unavailable at the time of, for example, brewing, then the choice may have been made to use a sooted, undecorated vessel; again this would account for the internal attrition seen on undecorated urns. Despite the presence of sooting, or its lack of decoration, the promotion of this pot into a brewing vessel may have endowed it with significance and merited its role as a cremation urn at a later date.

Not all urns exhibit signs of use-alteration (Figures 2.17 and 2.19). Potentially, these vessels could have been examples that *were* produced for the funeral; however their lack of attrition could equally be due to one or more of the following factors. Firstly, hard, well-fired pots are less susceptible to attrition than softer, lower fired ones (Schiffer and Skibo 1989); as there is considerable variation in the hardness of Anglo-Saxon cremation urns (due to poor control of firing conditions; see Chapter 1), some will abrade more readily than others. Secondly, for abrasion to take place, the abrader must be harder than the ceramic paste and small enough to get between temper particles (Skibo 1992, 116). If a vessel was stored on straw, reeds, or cloth it would be less likely to develop basal abrasions. Thirdly, if pots are thoroughly cleaned after use, the likelihood of them developing attritional markers indicative of fermentation is considerably reduced (Arthur 2002, 348). Finally, relatively new pots, or those belonging to households that rarely produce fermented foodstuffs, will be less affected than those belonging to frequent producers.

This discussion so far has examined the possibility that vessels were not made specifically for the funeral, and it is now necessary to re-evaluate the hypothesis that they were manufactured for a particular client. Without doubt, it is possible that individual pots were manufactured for, and used by, the deceased as personal vessels while they were alive; this would certainly account for Richards's (1987) correlations and would also allow for the development of attritional markers in the context of daily use. A further possibility is that urns were part of a range of pots manufactured to fulfil specific domestic functions[2], but in the knowledge that at a later date they may be used to house the remains of a household member. Indeed, as is the case ethnographically (Arthur 2006, 88; Dietler and Herbich 2006, 398-400), there is every possibility that a household possessed a number of pots associated with the production and consumption of fermented products. If these pots were decorated with respect to family traditions – and at death a cremation vessel was selected from the deceased's household according to culturally controlled rules – then this would account for the use-alteration we see, the correlations identified by Richards (1987), and the clustering of similarly decorated urns in the cemeteries (see Chapter 4). Certainly, the burial of similarly styled vessels in the same urn-pit, or in close proximity to each other, suggests that decoration might have family significance (see for example Hills 1980, 204-6; McKinley 1994, Pl. XIII).

Finally, if these decorated pots were domestic in origin, we must consider why they account for only c.5% of settlement ceramic assemblages. The first point to note is that this 5% is a considerable underestimate of the actual number of decorated vessels that existed at domestic sites. As decoration is largely confined to the upper half of Anglo-Saxon pottery, many undecorated sherds that are found in settlement contexts probably originate from decorated vessels.[3] Moreover, if we assume, as the data demonstrates, that decoration is linked to function, then by taking account of ethnographic ceramic censuses and use-life data we can begin to see these pots in the context of day-to-day life and their subsequent incorporation into the archaeological

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[2] As we will see in Chapter 3, the different sizes and forms that cremation urns take means that they have very different functional properties. It is likely that these different forms enabled them to enact roles in different stages of the production and consumption processes, for example, brewing, drinking and serving.

[3] For example, if ten complete vessels – two decorated and eight plain – were each broken into 100 sherds, then (because decoration is largely confined to the upper half of the pots), we would have roughly 100 decorated sherds and 900 plain sherds. In this situation, decorated sherds would account for 10% of the assemblage (by sherd count) but in reality, before breakage, decorated vessels actually accounted for 20% of the assemblage. The highly fragmented nature of settlement pottery therefore skews our perception of the composition of settlement assemblages. Unless analysts are able to repatriate plain sherds with the decorated vessels that they came from, then it will always be the case that they underestimate the number of decorated vessels that were actually present at the domestic site.

record. For example, beer jars represent just 2.3-11.4% of pots found in Gamo villages, whilst those used for cooking account for 27.5-49.4% (Arthur 2006, 78). DeBoer and Lathrap (1979, Table. 4.4) record comparable proportions in Peru; here large jars used for beer storage accounted for just 2% of household pottery. If a similar situation existed in early Anglo-Saxon England, then the number of decorated ‘fermentation’ vessels entering the archaeological record would be considerably fewer than the number of cooking pots.

In addition to the proposition that there were smaller numbers of fermenting pots compared to cooking pots in early Anglo-Saxon settlements, we can also note that since fermentation processes, such as brewing, require vessels to stand for long periods of time, fermentation vessels are less prone to breakage and consequently have longer use-lives than their cooking-pot counterparts (Arthur 2003, 349-50; Bankes 1985, 276; DeBoer 1974, 338; DeBoer and Lathrap 1979, Table 4.5; Mills 1989, 137). Indeed, despite their internal attrition, the mean age at breakage of Gamo beer jars is 2.7 years, compared to 1.1 years for cooking-pots (Arthur 2002, 345, 349-50). If the same was true in early Anglo-Saxon England then, with fewer breakages compared to cooking pots, fewer decorated vessels would be expected to enter the archaeological record. Evidently, the small proportion of decorated pottery found on settlement sites can be explained in terms of daily use and breakage patterns. It need not represent, as Richards (1987, 53) suggests, funerary vessels that were broken in storage or manufacture.

To account for the disparity between the proportions of decorated vessels in cemeteries compared to settlements, we can add to this ethnographic census and use-life data that which was hypothesised in Chapter 1: that is, only small numbers of decorated pots were kept in a settlement at any one time, at the time of a death one of those was selected to be an urn, then, at a later date, this was replaced with a new decorated pot. With each subsequent death, the proportion of decorated pots in the settlement would remain constant whilst the number in the cemetery increased. In light of the evidence discussed in this chapter, this does not seem an unfeasible suggestion. With this realisation, we can begin to re-evaluate a number of previously advanced, generally accepted – yet notably untested – hypotheses regarding funerary practices and the treatment of cremation urns. One such phenomenon is the custom of making post-firing perforations in the bases and lower walls of cremation urns. The remainder of this chapter re-evaluates the practice of post-firing perforation in light of the evidence presented above.

Post-Firing Perforation of Cremation Urns

Purposefully drilled post-firing perforations (PFPs) occur in the lower walls and bases of c.10% of early Anglo-Saxon cremation urns (Figure 2.22) (Leahy 2007a, 82; Richards 1987, 154). Although similar *pre*-firing perforations, functioning as suspension loops, are seen close to the rims of domestic vessels, these post- firing perforations have been interpreted as symbolic and as serving no practical purpose (Richards 1987, 57). Such explanations are unsurprising, given that the general consensus is that urns were manufactured specifically for the funeral (Richards 1987, 206). Given that the above discussion suggests, however, that the majority of vessels were obtained from the domestic sphere, and that a significant proportion were employed in processes involving fermentation, this section considers the possibility that PFPs were related to functional activities. It first outlines the characteristics of PFPs, before moving on to provide an account of previous interpretations of these features. Consideration is then given to other instances of PFPs in the historical and archaeological record, including those from contemporary settlements and examples from the Iron Age and Romano-British periods. Finally, PFPs are placed in the context of the domestic activities suggested by the Cleatham and Elsham urns.

The Characteristics and Previous Interpretations

Post-firing perforations are principally located in the lower regions of vessels, mainly in the base or basal angle and, while examples of multiple perforations do exist, the majority occur singly (Figure 2.12 and 2.21 and Table 2.1). Their morphology suggests that most were produced from the inside by a boring or drilling action, perhaps with a knife, with the resulting holes being in the range of c.10-20mm in diameter. In some instances molten lead has been poured into the hole which creates a ‘plug’ that completely seals the original perforation (see for example Leahy 2007b, 55). Both practices are widespread; indeed, Richards’s (1987, 57, 154) study, which considered 2400 urns from eighteen cemeteries across England, established that c.10% of cremation urns have some form of hole, either open or plugged.

Various explanations for the presence of these holes and lead plug ‘repairs’ have been advanced, but, as most authors acknowledge, none is completely satisfactory. It has been claimed, for example, that PFPs provided a means for the spirit of the deceased to come and go from the urn at will, yet the plugging of some perforations would appear counter-intuitive to this explanation (Lethbridge 1951, 13; Richards 1987, 77-8).

Alternatively, it has been suggested that they represent ritual killings, the perforation rendering the pot useless to the living and thus dedicating it to the dead (Richards 1987, 77). Again, however, if the pot *was* to be decommissioned, one must still account for the presence of lead plugs in some holes. Richards (1987, 78) argued that these 'repairs' may not have been serviceable, proposing that the lead may have melted if used over a fire. While this is a possibility, this explanation fails to acknowledge that not all pots are used for cooking; a plugged pot would, for example, serve quite adequately as a storage jar for dry goods. Moreover, there is evidence from other periods to suggest that the practice of repairing pottery with lead can be entirely functional. Lead clamp repairs, formed by pouring molten lead into drilled holes, are known from the Roman period (Peña 2007, 238-9), whilst molten lead was used to form plug repairs in medieval England (Pearce *et al*. 1985, 47).

A further problem with the ritual killing hypothesis is the small proportion of perforated urns. If the intention was to dedicate the pot to the dead then we must explain why the remaining 90% of urns are un-perforated (Richards 1987, 77). Perhaps the method of 'killing' was not always the same; indeed the removal of a fragment of the rim may have served quite adequately as a symbolic deformation (as in Roman cemeteries, see Taylor 2001, 102). Yet, many urns remain complete, showing no sign of damage at all. There is also the commonly occurring paradox of perforated vessels which were buried contemporaneously with un-perforated pots (Table 2.2). Perhaps, in these instances the holes are symptomatic of the deceased's age or status and therefore help to distinguish them from their burial partners. Indeed, Richards (1987, 155-7) observes that persons buried in holed vessels are more likely to possess grave goods, and, although there is no correlation with a particular gender, holed urns tend to contain the remains of adults. Despite these observations, this still does not confirm that the holing was a mortuary performance. There is potential, for example, that the holed pot had taken part in some domestic activity in which the deceased was involved. Indeed, of the perforated vessels from Lackford (Suffolk), Lethbridge (1951, 13) reports that '[s]ome were probably used as churns, as was the case in recent times in the Hebrides'. This reference to dairying provides the only attempt at a functional interpretation for PFPs and will be returned to later.

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Figure 2.22: Post-firing perforation in the basal angle of Cleatham urn 169.

Location	**Cleatham %**	**Elsham %**
Base	44%	61%
Lower Wall	22%	11%
Basal Angle	10%	22%
Multiple Base	10%	0%
Lower Wall and Base	4%	0%
Mid and Lower Wall	3%	0%
Base and Basal Angle	3%	6%
Mid Wall	1%	0%
Multiple Upper Wall	1%	0%
Lower Wall, Basal Angle and Base	1%	0%
Basal Angle and Lower Wall	1%	0%
Total	100	100

Table 2.1: The locations of post-firing perforation in urns from the Cleatham (n = 81) and Elsham (n = 18).

Cemetery	Urn Number(s): Perforated Urn(s)	Urn Number(s):Un-Perofrated Urn(s)	Source
Spong Hill	2815	2814, 2816	Hills *et al*. 1994, Figures 29, 64 and 134
Cleatham	57	55	Leahy 2007a, Figure 115; Leahy 2007c
Cleatham	63	63	Leahy 2007a, Figure 115; Leahy 2007c

Table 2.2: Selected examples of perforated and un-perforated urns that were buried in the same urn pits.

Perforations, Plugs and Repairs in the Iron Age and Romano-British Periods

In discussing the occurrence of lead plugs at Cleatham, Leahy (2007b, 55) draws comparison with lead plugs found in second-century AD cremation urns from the Romano-British cemetery of Gilliate's Grave (North Lincolnshire). This observation implies that this 'ritual' was practiced well before the onset of the Anglo-Saxon period, and, indeed, if one examines excavation reports of Iron Age and Romano-British sites it becomes quite clear that the perforation of ceramic vessels after firing was a well-established tradition. For example, in commenting on the ceramics from the late Iron Age site of Nazeingbury (Essex), Huggins (1978, 76, Figures 12-14) reports that 'the practice of boring holes in pots after firing, usually in the base but also in the sides, was common as on other Belgic sites'. As her figures illustrate, these holes occur singly, or in multiples of up to three, and are similar in size to those found in Anglo-Saxon pottery. Similarly, Webley and Anderson (2008, 65, Figure 2.28) illustrate three late Iron Age jars from Addenbrooke's (Cambridgeshire), and, once more, the holes appear singly or in multiples up to four, and their size and locations are similar to those found in Anglo-Saxon cremation urns. A further two-holed middle Iron Age example from Bedfordshire is illustrated by Webley (2007, 227, Figure 8.3). Here, the perforations are not in the base but are 'drilled immediately above' it; again, the location and method of manufacture correlate with the PFPs in Anglo-Saxon cremation urns. Finally, Green *et al*. (2004, 326, Figure 7.23) illustrate three late Iron Age and early Roman jars from the Thames Valley, all of which have single PFPs in their bases.

As is the case with the early Anglo-Saxon examples, few authors (except Fulford and Timby 2001) have attempted to explain the perforation of Iron Age and Roman vessels in functional terms, if at all. Indeed, Green *et al*. (2004, 326) concede that 'the purpose of this, a common feature ... is unclear', similarly Huggins (1978, 77) reports that these ‘holes imply some specific and widespread practice which is not yet understood’, whilst Webley (2007, 227) returns to the idea of ‘ritual killing’. Certainly, the context of deposition of many Iron Age pots with PFPs would suggest some form of structured placement; in fact all the above-mentioned examples derive from ditches, pits and wells, while Webley’s (2007, 227) vessel was notably associated with human remains.

Perhaps the most significant assemblage of perforated vessels are those found in the Silchester Collection (Reading Museum and Art Gallery). This collection contains 76 late Iron Age to late fourth-/early fifth-century vessels which have perforations in their ‘bellies’, whilst a further eighteen have them in their bases. Of the basally perforated pots, seven are dated to the late first century BC/first century AD, four are second-century, whilst the remainder are third- and fourth-century (Fulford and Timby 2001, 293-6). Once more, all but a single vessel derives from a pit or well and, again, such find-spots suggest carefully placed ritual deposits. Yet, although Fulford and Timby do not deny that the deposition of these vessels may have formed part of a ritual activity, they argue that the act of forming these holes was not part of this performance. Indeed, if the intention was to kill the pot, they question why many were deposited alongside similar vessels that were not perforated. Concurrently, as a number of vessels possess multiple PFPs, often of different shapes and in different locations, some of which have been filled with lead whilst others remain open, there is considerable potential that perforations were made on different occasions, with different tools, and perhaps with a significant lapse of time between them. In summary, this evidence, they argue, does not represent instances of ritual killing, rather it demonstrates cases of modification and repair resulting from changes in vessel function.

As these examples reveal, the practice of perforating and plugging vessels had considerable and sustained heritage in both funerary and non-funerary contexts long before its appearance in early Anglo-Saxon cremation cemeteries. Moreover, further examples of perforated vessels are known from non-funerary contexts in later periods. Indeed, Moorhouse (1991, 104, 108, Figure 9.9) presents two late Saxon vessels from Northamptonshire which have PFPs in their bases, whilst Adams Gilmour (1988, 116, Figure 33) illustrates a mid to late twelfth-century jar from Lincoln with a single PFP above the shoulder and an example of a PFP just above the basal angle of a twelfth-century jar is provided by Young *et al.* (2005, 121, Figure 107). Allied with the evidence for PFPs and repair on settlement sites (see below), we must consider that what we are dealing with may not be the visible remnants of an early Anglo-Saxon funerary ritual, but the remains of a domestic practice effectively preserved in the burial record. The following section therefore considers the potential roles that perforations may have played in domestic activities.

Functional Perforations and Modified Pots

In an attempt to understand the perforated vessels in the Silchester collection, Fulford and Timby (2001, 295) have drawn attention to the deliberate perforation of vessels in the preparation of the fish sauce known as *garum*. Indeed, in a tenth-century agricultural compilation from Byzantium, *Geoponica*, we learn that to make *garum*, salt is added to the entrails, gills, blood and juices of the tunny fish. This mixture is then left to stand 'for two months at most' and after this time we are told that it is necessary to 'pierce the vessel and the *garum*, called *Haimation*, is withdrawn' (*Geoponica*, 20.46, 6; Curtis 1991, 13). While we do not know exactly what the purpose of early Anglo-Saxon perforated vessels was, from this example we must accept that holes made after a pot has been fired can be entirely functional.

Further examples of functional PFPs can be found in the context of the production of butter and cheese. As previously mentioned, Lethbridge (1951, 13) alluded to the use of PFPs in Hebridean dairying practices and Mann (1908, 326-7, Figure 1) confirms this in a late nineteenth-/early twentieth-century account of butter churning from the same region. To begin with, an ordinary handmade, low-fired, pot known as a *craggan* was modified by the insertion of a 'single, carefully made perforation, about ¾ inch in diameter, in the side of the vessel, 3 or 4 inches from the rim'. This pot was then 'partially filled with milk, a cloth was tied tightly over the mouth of the vessel, which was then rocked backwards and forwards until the butter was made'. The hole, Mann suggests, is necessary for the gases generated in churning to escape, otherwise the pressure inside the vessel would be too great and the *craggan* would burst. Almost two millennia before Mann, Pliny the Elder (*Historia* XXVIII, xxxv; Bostock and Riley 1855) provided a nearly identical account of butter churning in northern Europe; here, milk was shaken 'to and fro in a tall vessel, with a small orifice at the mouth to admit the air, but otherwise closely stopped'.

The most direct literary reference to the creation of PFPs in the lower regions of vessels is provided by the first-century writer Columella (*De Re Rustica* XII, VIII, I; Forster and Heffner 1955). In the manufacture of sour milk, or curds, we are told to:

> '[t]ake a new vessel and bore a hole in it near the base; then fill up the hole which you have made with a small stick and fill the vessel with the freshest possible sheep's milk and add to this small bunches of green seasonings ... After the fifth day take out the small stick with which you blocked up the hole and drain off the whey; then when the milk begins to flow, block up the hole with the same stick and, after an interval of three days, let out the whey in the manner described above and take out and throw away the bunches of seasonings ... after an interval of two days, again let out the whey and block up to hole and add as much pounded salt as shall suffice, and mix the whole together. Then put a cover on the vessel and seal it up, and do not open the vessel until the contents are required for use.'

Finally, although not strictly PFPs, the locations of bungholes in medieval cisterns are of note here, as they draw parallels with a number of PFPs in Anglo-Saxon vessels. Cisterns are essentially large jars or jugs with a hole just above the base which allows liquids, such as beer and ale, to be drawn off without disturbing any sediment that may have collected on the base (Jennings 1992, 4; McCarthy and Brookes 1988, 112-13). From fifteenth-century accounts, wills and inventories, we learn that cisterns were used in conjunction with 'spiggots', 'ducels' and 'forcets'. These wooden items are thought to have been inserted into the bunghole and used as a means of controlling the flow of liquid (Moorhouse 1978, 8; McCarthy and Brookes 1988, 112). As the above examples demonstrate, pots can be easily modified to fulfil specific functions, and given the limited range of early Anglo-Saxon vessel forms, it would not seem unreasonable to suggest that early Anglo-Saxon pots could be adapted for use in similar ways. Certainly, in conjunction with a bone or wooden plug, such perforations could have functioned in a comparable manner.

In summary, these examples show that PFPs can be entirely functional and that, in the absence of a dedicated vessel, it is relatively easy for pots to be modified in order to carry out specific tasks. It is possible, therefore, that the perforated vessels found in cemeteries are the result of such modifications. Furthermore, with the exception of the butter churns, the common feature linking all the above examples is the desire to separate a solid from a liquid, particularly in the preparation of fermented foodstuffs. It is encouraging to find, then, that the use-alteration analysis of cremation urns from Elsham and Cleatham suggested that these urns *were* likely to have been involved in fermentational processes such as dairying and brewing. Given this insight into the pre-burial functions of these urns, and the fact that the historical examples of PFPs all involve dairying and fermentation, it is now necessary to consider the development of attrition alongside the presence of PFP and lead plugs in Anglo-Saxon urns.

The Use-Alteration of Perforated Cremation Urns

Leahy (2007a, 82) records that 81 of the Cleatham urns have PFPs. Seventy-nine of these vessels were examined by the author and 42% (33) were found to be suffering from the internal pitting described above. When this figure was compared with the overall percentage (31%) of pitted complete vessels from Cleatham (see above), we find that pitting occurs more frequently on perforated urns than it does on the urn assemblage as a whole. Moreover, a Chi-squared test for independence demonstrates that internal pitting occurs more frequently on perforated than un-perforated urns and that this relationship is significant at the p=0.004 level (Chi-squared tests with Yates Continuity Correction, $\chi^2 = 8.36$, p= 0.004). Although it is acknowledged that caution needs to be exercised when dealing with such a small sample, there is a suggestion that vessels with lead plugs are also more commonly internally pitted than the rest of the assemblage. Indeed, fourteen of the fifteen Cleatham urns which were identified as having lead plugs were examined and 36% (5) of these were internally pitted.

Perforated and lead-plugged urns were also noted in the Elsham assemblage (Table 2.1). The number identified here, however, was considerably smaller than that identified at Cleatham; there were just eighteen PFPs, three of which were plugged. Lead plugs were found in association with a further four urns but due to the level of preservation of these urns the holes form which they originated were unidentifiable. Use-alteration analysis of the PFP urns demonstrated that, as at Cleatham, pitting occurred more frequently on perforated urns than it did on the assemblage of complete vessels (29% compared to 22%). A Chi-squared test for independence was also undertaken on this relationship, but like the other attempts at statistical analysis on the Elsham dataset, the sample size was too small to obtain meaningful results.

When the use-alteration evidence is considered alongside the historical and anthropological evidence discussed above, the distinct possibility arises that PFPs were not related to funerary rituals, but were rather involved in the production and consumption of fermented produce. Whether the internal pitting developed whilst the perforations were functioning, or whether perforations were fashioned in pitted vessels to enable them to take part in secondary use-activities, such as the straining or dispensing of fermented produce, is unknown. Nevertheless, the statistical analysis of the Cleatham urns demonstrates that there *is* a direct link between internal pitting and the presence of PFPs.

Placing Post-Firing Perforations in an Anglo-Saxon Context

Unfortunately we do not have any literary evidence from the early Anglo-Saxon period that provides accounts of perforated vessels in use. However, by considering the archaeological evidence, and earlier and later documentary accounts of food and drink production, consumption and distribution activities, we can potentially place the Anglo-Saxon perforated vessels in such a context. The following discussion therefore considers the evidence for both dairying and brewing activities.

Both Pliny (*Historia* XXVIII, xxxv; Bostock and Riley 1855) and Mann (1908, 326-7, Figure 1), writing in the first and early twentieth centuries, respectively, observed that butter was produced using vessels with holes drilled immediately below their rims. It is unlikely that the Anglo-Saxon vessels with perforations in their lower walls and bases were used to produce butter in the way described in their accounts. Indeed, in this case the vessel would need to be inverted so that the PFP could function as a gas escape hole. In such a position the entire weight of the liquid would rest upon the skin or fabric lid and likelihood of spillage and wastage of the contents would be extremely high. Nevertheless, the single Cleatham urn with a PFP close to the rim could have been used to produce butter in the manner described. Although we cannot say for certain whether this vessel was being used in this way before its burial we do know that butter was being consumed in Britain in the sixth and seventh centuries and that butter production can result in internal attrition (Arthur 2002, 336-7). Indeed, butter is mentioned in the sixth-century *Preface of Gildas on Penance* (i; McNeill and Gamer 1990, 175) and in the seventh-century *Penitential of Theodore* (Book I, I, vi; McNeill and Gamer 1990, 185). Intriguingly, later documentary evidence suggests that it may have been considered as having healing properties and that it held economic value. Indeed, its medicinal qualities are demonstrated by its inclusion in remedies throughout Bald’s late ninth- or early tenth-century *Leechdoms*, for example, in the treatment of burns, shingles, and intestinal worms (*Leechbook I*, xxxvi; III, xxi, xxix; Cockayne 1865, 87, 321, 325), whilst butter’s economic worth is suggested in food rents from middle and later Anglo-Saxon laws and charters. In *The Laws of Ine* (c.AD 688-694), for example, ‘a full amber of butter’ (*anmber fulne butteran*) is required in the food rent from every ten hides (*Laws of Ine* 70.1; Attenborough 1922, 34, 58-9). Similarly before the onset of the Anglo-Saxon period, we again see that butter held economic value; indeed, Pliny records that its consumption, in first-century northern Europe, distinguished the 'wealthy from the multitude at large' (*Historia* XXVIII, xxxv; Bostock and Riley 1855). Perhaps, then, if a perforated urn had been used to produce butter, this may have made some statement about the deceased's status, or it may have been thought to possess some medicinal, magical or amuletic qualities that would merit its use as an urn. Certainly, as Richards (1987, 155-7) notes, persons contained in perforated vessels are more likely to possess grave goods.

Although not a direct observation of the early Anglo-Saxons, in the first century AD we know that the Germanic peoples enjoyed a 'curdled milk' product perhaps not dissimilar to that described by Columella (see above) (*Germania* XXIII, xxxv; Church and Brodribb 1942). If a similar product was not already being made in England before the Migration Period, it is certainly possible that it was introduced at this time; indeed, whey, buttermilk and 'British cheese' are all mentioned by Gildas (*Preface of Gildas on Penance*, i, ii; McNeill and Gamer 1990, 176-7). Given the possibility of dairy practices suggested by the cremation urns from Cleatham, the presence of possible cheese strainers[4] at early Anglo-Saxon sites such as Mucking (Hamerow 1993, 44-5), the use of whey in remedies in the *Leechdoms* (*Leechbook III*, xxxix; Cockayne 1865, 333) and the fact that the shepherd's duties in *Ælfric's Colloquy* (of the late tenth to early eleventh century) include making butter and cheese (Watkins 2006, 4), it would not be unreasonable to suggest that the early Anglo-Saxons manufactured similar dairy products. Such procedures may therefore have necessitated holed vessels which would facilitate the separation of curds and whey.

As with dairying, similar modes of separation can be suggested with respect to beer or ale. Although there is no direct evidence for beer/ale production in the early Anglo-Saxon period, we do know that in the first century AD Germanic peoples produced 'liquor for drinking ... made out of barley or other grain, and fermented into a certain resemblance to wine' (*Germania* XXIII, xxxv; Church and Brodribb 1942). Likewise, in the early fourth century we learn from Diocletian that Pannonian and Celtic beer was being imported to Rome (*Edict of Maximum Prices*; Frank 1940, 322), whilst Anglo-Saxon sources from the seventh century onwards repeatedly mention beer and ale. In a seventh-century Penitential, for example, Theodore states that 'laymen' who

[4] Bowl-shaped vessels with multiple perforations made in the clay before firing.

are ‘drunk against the Lord’s command ... shall do penance for twenty days ... without beer’ (*Penitential of Theodore*, Book I, I, vi; McNeill and Gamer 1990, 184). Similarly, in the seventh-century *Laws of Ine*, the food rent from ten hides includes ‘12 ambers of Welsh ale’ and ‘30 ambers of clear ale’ (*XII ambra Wilisc ealað, XXX hlutters)* (*Laws of Ine* 70.1; Attenborough 1922, 59), whilst ‘clear’, ‘Welsh’ and ‘mild’ ale are all mentioned in an agreement between Ceolred, Abbot of Peterborough and Wulfred in AD 852 (Roberston 1939, 13).

Given that the raw ingredients of beer/ale are grain and water, one would expect at least some attempt to remove the ‘wet residuary materials of malt liquor’ (known in O.E. as *gryt*) (Cockayne 1865, 389) from the beverage before consumption. Perhaps, then, ‘clear’ refers to ale which has been strained or filtered after mashing or fermentation; certainly, reference is made to ‘new ale, before it be strained’ in a late ninth- or early tenth-century remedy (*Leechbook I*, li; Cockayne 1865, 125). Moreover, we learn from *Beowulf* (ll. 767-9a; Bradley 1982, 432; Lee 2007, 136-7) that the dregs of the brew were considered to be disagreeable: ‘[f]or all the Danes dwelling in the fortress, for those earls and for every brave man it was the bitter dregs of the ale’ (*Denum eallum wearð, ceaster-buendum, cenra gehwylcum, eorlum ealu-scerwen*). It may seem unreasonable to suggest that a single hole in the base, lower wall, or basal angle could facilitate the separation of the wort from the mash, in that the liquid could easily drain away, yet this can be readily explained. When a filtering medium, such as hay or straw, was placed in the base of a vessel, behind the perforation, the wort would have been easily drawn from the mash; the solid matter would have been caught in the hay and the filtered wort would have flowed through the hole and been collected in a separate vessel. This very technique was used in wooden barrels in the Orkney Islands up until the last century (Graham Dineley pers. comm.). Likewise, Odd Nordland (1969) describes in considerable detail the use of plant material as a medium for filtration in the separation of the wort and mash in domestic breweries in early twentieth-century Norway. The basal and lower wall locations of these holes would mean that if such a method of filtration was employed then the perforated vessel could be fairly easily stacked inside the mouth of another pot, thus aiding the collection of the wort (see Chapter 3).

That beer/ale may have been considered significant in Anglo-Saxon mortuary contexts is suggested by the burning of its raw ingredients at funerals and the subsequent incorporation of these charred remains within the grave. In the seventh-century *Penitential of Theodore*, for example, we learn that whoever takes part in the practice of burning grain 'where a man has died ... shall do penance for five years' (Book I, XV, iii; McNeill and Gamer 1990, 198), whilst substantial quantities of burnt grain have been recovered from the fifth- to sixth-century cemeteries of Sandy (Bedfordshire) and Marston (Northamptonshire) (Meaney 1964, 40,192; Meaney and Hawkes 1970, 31-2) and from sixth-century grave fills at Castledyke (North Lincolnshire) (Carrott *et al.* 1998, 240-1; Leahy 2007b, 56). If beer or ale was a significant consideration at the funeral or in the afterlife, then perhaps the vessels used in their manufacture were imbued with significance and this merited their use as containers for the dead (see Chapter 6). Given that the internal attrition on the Cleatham urns suggest brewing activities, perhaps these vessels with PFPs were involved in such straining and dispensing activities; certainly the location of many perforations draws parallels with medieval cisterns (see above).

In addition to the discovery of the raw materials of beer production in burials of this period, we can also, of course, add the vast array of drinking-related paraphernalia deposited in graves. For example, glass vessels, bronze-bound wooden buckets, drinking horns, wheel-thrown vessels found in Kentish graves (probably associated with imported wine), wooden drinking bowls and ladle-shaped strainers are all types of drink-related utensils that occur in Anglo-Saxon mortuary contexts (each of these forms of material culture will be discussed in more detail in Chapter 6). It would appear, then, that drinking was held in high regard in this period and it was inextricably linked with burial practices (Arnold 1988; Cook 2009; Evison 1979; Harden 1978; Hills *et al.*1984; Hirst and Clarke 2009; McKinley 1994; Ravn 2003; Stoodly 1999). The presence of such vessels in early Anglo-Saxon mortuary contexts correlates perfectly with the pre-burial functions suggested by the use-alteration analysis of cremation urns.

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Figure 2.23: A post firing perforation in a basal angle sherd from the non-funerary find site of Manton Warren (MTBX). Note that the perforation is made just above the basal angle (in this image the sherd is upside down).

Perforations and Repairs on Settlement Sites

Given the possibility that urns with PFPs were initially domestic in nature, we must consider the evidence for such holed vessels in settlement contexts. Regrettably, there is a distinct lack of basal and lower wall perforations on vessels from settlement sites. Indeed, a search of excavated settlement reports, including Mucking (Essex) (Hamerow 1993), West Stow (Suffolk) (West 1985), Riby Cross Roads (North Lincolnshire) (Steedman 1994), Catholme (Staffordshire) (Losco-Bradley and Kinsley 2002), and Pennyland and Hartigans (Bucks) (R.J. Williams 1993), provides only a single example of an illustrated perforated vessel (it seems significant that the illustration appears to show that this vessel, from Pennyland, also suffered from internal pitting (Blinkhorn 1993, Figure 103)). Similarly, only two PFP vessels were identified in the current survey of 80 non-funerary find sites in North Lincolnshire (from Barnetby-le-Wold and Manton Warren) (Figure 2.23). There are a variety of reasons, however, why vessels with PFPs are rarely found in settlement contexts, including the mode of deposition, practices of re-use and repair, archaeological interpretation, and the fact that PFPs are found more commonly in decorated pots; each variable will now be considered.

At the most prosaic level, a distinction based upon the completeness of vessels at the point of deposition can be drawn between settlement and cemetery ceramic assemblages. For example, in cemeteries, complete vessels are carefully placed in purposefully dug urn-pits and, provided that a vessel was at a sufficient depth to protect it from later plough damage, it will remain largely complete and in a primary deposit. In such instances it is relatively simple to identify a PFP. On settlement sites, however, assemblages consist mainly of sherds which are rarely from primary deposits and as a result sherds are often small and abraded. Consequently, depending on a PFP's size and location in relation to the edge of a sherd, it can be difficult to confidently identify examples (Fulford and Timby 2001, 296). Moreover, as PFPs are more common on decorated vessels, and as decorated vessels constitute between c.35-65% of cremation cemetery assemblages but just c.5% of settlement assemblages (Blinkhorn 1997, 117; Hirst and Clark 2009, 594-5; Leahy 2007a, 71; Richards 1987, 155), the chance of identifying a PFP on a settlement site is further reduced.

In addition to the difficulties in identifying PFPs, both ethnographic and archaeological studies demonstrate that broken pots are often not discarded, but are employed in secondary activities (e.g. Arthur 2006, 102-20). The same was probably true in the early Anglo-Saxon period and broken perforated vessels may have found new lives. For example, given that the perforations would have already been made and that most are in the base, the flattest, roundest, thickest, and heaviest part of the vessel, after failure such pots would provide an ideal source of material for the manufacture of spindle whorls. Encouragingly, in the report on West Stow, West (1985, Figures 39 and 124) illustrates two, thick, early Anglo-Saxon wall-sherds which were used in precisely this way. It is impossible, however, to determine whether the holes existed before the sherds were adapted for this secondary use.

Given the problems associated with identifying PFPs, we should consider whether lead plugs, by proxy, offer a means of identification of PFPs on settlement sites. However, the identification of such plugs is similarly problematic. For example, Leahy (2007a, 82; 2007c) reports that fifteen plugs were found in urns from Cleatham, however he records that just three of these were embedded in perforated vessels. A similar situation is noted at Elsham, where of the seven lead plugs identified, just three were embedded in perforations. The dislocated plugs were found amongst the cremated remains and sherds of damaged urns and the PFPs from which they originated were unidentifiable. One has to question, therefore, whether these pieces of lead would have been interpreted as plugs had they not been associated with a cremation urn. Undeniably, when they are removed from the vessel they appear as non-descript lumps of lead (Figure 2.24). Thus, when discovered on settlement sites, such plugs are likely to be recorded as just that.

Adding further to the difficulties of identification of repair are those vessels which may have been mended with materials other than lead. Magnus (1980, 276-282), for example, has drawn attention to the repair of bucket-shaped pots in fourth- to sixth-century Norway and, in particular, she reports on holes which have been fixed by the insertion of clay. The present author has previously drawn attention to a 'pottery plug' found in the fill of a sunken-featured building at West Stow which, judging from its morphology and dimensions, would have fitted almost perfectly into a typical PFP (Figure 2.24; Perry 2012). It was proposed that this might indicate that the same mode of reparation was in use in early Anglo-Saxon England. Since the publication of that article, this suggestion has been proved correct; indeed, clay was used to repair a hole in the base of Elsham urn EL76GJ (Figure 2.25). Such fixes would undoubtedly be plagued by problems associated with the shrinkage properties of clay; however this would only be of concern if the repaired pot was required to hold liquid. In a similar vein, Kinsley (1989, 27) has suggested that unplugged perforations from urns at Millgate (Newark-on-Trent, Nottinghamshire) may have been 'sealed with some perishable material now disappeared'. Presumably, wood, cloth, leather and wax would all at some level serve as functional repairs. Concurrently, Peña (2007, 214) provides a number of textual Roman sources which describe the preparation of putty-like substances used in the repair of damaged pottery, the main ingredients of which were beeswax and pine resin. In summary, there is ample evidence to suggest that the use and repair of PFPs may have been taking place at settlement sites, but in combination, the above-mentioned factors essentially eradicate their archaeological visibility.

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Figure 2.24: Left, a 'pottery plug' from West Stow (redrawn from West 1985, Figure 50.10.), and right, a lead plug recovered from Cleatham urn 458 (redrawn from Leahy 2007c).

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Figure 2.25: Elsham urn EL76GJ. The post-firing perforation in the base of this urn has been repaired by pressing wet clay into the hole and then re-firing the vessel (internal view, left; external view, right). Despite the fact that the urn has broken and has been subject to post-excavation restoration, the circular shape of the original post-firing hole is preserved in the clay plug (right).

Repair, Reuse and Burial

In light of the evidence discussed above – which demonstrates that post firing perforations can be entirely functional and can serve a domestic purpose – there is potential that the lead plugs were also functional, in that they were an attempt to 'repair' a perforated vessel. Yet, if the intention was to separate solids from liquids, we must ask why the hole was subsequently plugged. One possible explanation is that role of the pot changed and that the perforation was not necessary for the activities in which it was newly employed. This may have happened as a result of a newer vessel being made available, or alternatively the perforated pot may no longer have been able to fulfil its duties. Indeed, the low-fired porous nature of this pottery may have resulted in the absorption, retention and subsequent decay of previous contents. This was certainly the case in the Hebrides where the putrefaction of absorbed residues made it nearly impossible to produce sweet milk in much-used *craggans* (Cheape 1988, 22-3). Perhaps, if this happened with Anglo-Saxon vessels, rather than dispose of the pot the decision may have been made to plug the perforation and employ it in the storage of dry goods, for example. This would certainly explain why some PFPs in the cemeteries are plugged whilst others remain open; the lead plugs would therefore represent domestic reparations preserved in a funerary context.

Alternatively the choice to plug a vessel may have been made on account of the desire to send a 'complete' urn to the grave. As Williams (2004b, 277, 282) discusses, the collection and deposition of cremated remains in a ceramic vessel may be considered as a symbolic representation of the deceased, a 'second body', with the pot acting as a 'metaphorical skin'. It is certainly possible that there was a desire to create a sealed vessel that would ensure that the remains stayed together and remained separate from the surrounding earth. Indeed, as McKinley (1994, 103) notes, some urns do have ceramic lids, whilst others may have had lids of skin, textile, or wood. If the intention was to create a sealed whole then we must again consider why some pots are plugged whilst others appear to have remained open. This may simply have been a consequence of material choice or availability; indeed, as discussed, other holes may have been plugged with perishable materials such as wood, leather, cloth or wax.

Conclusion

This chapter has demonstrated that the existing arguments for both specialist manufacture of Anglo-Saxon cremation urns and re-use of domestic vessels are based on what can only be described as an abundance of circumstantial evidence, and that neither theory allows us to identify – or at least suggest – pre-burial origins for any more than c.3% of cremation urns. By taking a use-alteration approach to the study of urns from the cemeteries of Cleatham and Elsham it has been demonstrated that there is a plethora of data which is often overlooked, but which allows us to identify instances of pre-burial use and suggest pre-burial functions for each individual vessel. It has been shown that by taking such an approach 71% of both the complete Cleatham and Elsham urns (n=116 and n=95, respectively) showed signs of pre-burial use. Moreover, 31% of the Cleatham urns and 22% of the Elsham urns appear to have been used in processes involving fermentation, whilst the distribution of attrition demonstrates that a vessel's decoration was directly linked to its pre-burial function. There is every possibility, therefore, that these cremation urns were not manufactured for the funeral, but that they originated from the domestic sphere. This suggestion is supported by the fact that the same range of use-alteration characteristics was noted on pottery from the 80 non-funerary finds sites. It is possible, then, that it was an urn's previous domestic function which dictated whether it was suitable for use as a cinerary urn, or, indeed, suitable for a particular individual.

In light of this evidence the often noted practice of boring holes in the bases and lower walls of cremation urns after they have been fired, and subsequently plugging them with lead, has been re-examined. A review of the previous interpretations of this practice demonstrates that interpretations are largely contradictory and unsubstantiated. By considering earlier and later historical and archaeological examples it has been shown that perforation of vessels after firing, and their subsequent plugging, is not a custom peculiar to the early Anglo-Saxon period; indeed, both practices belong to a seemingly unbroken tradition that can be traced back to at least the middle Iron Age. Moreover, historical records demonstrate that these perforations can be entirely functional in nature, with most accounts revealing that they were a means by which to separate solids from liquids, particularly in processes involving fermentation. Although there is no literary evidence for the production and consumption of these fermented products in the early Anglo-Saxon period, there is a wealth of data available in Roman and middle and later Anglo-Saxon sources which suggests that these fermented foodstuffs may have been produced in this period. More importantly, however, the manifestation of fermentational attrition on the interiors of urns from Cleatham and Elsham reveals that that this attrition is more common on perforated vessels than on the rest of the assemblage of complete vessels. There is a significant potential, then, that perforated urns may have taken part in food and drink processing activities prior to their burial and perhaps it was their inclusion in these activities which merited their use as cremation urns.

It has also been demonstrated that the practice of sealing perforations with lead can be explained in terms of modes of repair, changes of function, or a desire to send a 'complete' vessel to the grave. Although perforated and plugged vessels are extremely rare on settlement sites, their paucity can be explained in terms of context of deposition, taphonomic processes and practices of reuse and repair. Finally, although it is acknowledged that the results presented here derive from a just two cemeteries, both of which are in close proximity to each another, the fact that the same forms of attrition are seen on urns from the cemetery at Millgate (Newark-on-Trent) (Kinsley 1989) and at the settlement site of Mucking (Hamerow 1993) makes it is clear that this phenomenon is not region specific. There is every possibility, then, that the same practices will be observable on urns recovered from other cemeteries throughout early Anglo-Saxon England. Nonetheless, other cemeteries outside North Lincolnshire must undergo use-alteration analysis in order that the pre-burial function of cremation urns can be better understood.

Chapter 3

Functional Forms?

Introduction

In the previous chapter the results of a programme of use-alteration analysis of pottery recovered from the cemeteries of Cleatham and Elsham and the 80 non-funerary find sites were presented. These results demonstrated that early Anglo-Saxon cremation urns took part in domestic activities before their burial and, in particular, the evidence suggests that decorated urns were involved in the production and consumption of fermented produce. As a consequence of these results we can no longer view ceramic assemblages recovered from early Anglo-Saxon cremation cemeteries as simply funerary in nature; rather, they must be considered as domestic assemblages preserved in a funerary context. These findings are at odds with previous authors' interpretations of cremation urns; indeed, most believe that urns were produced especially for the funeral (for example Laing and Laing 1979; Leahy 2007a; Richards 1987; Wilson 1965). It is not surprising, then, that scholars have previously failed to investigate how the forms of urns might relate to their pre-burial functions. Given the evidence we now have for pre-burial use, we cannot ignore the possibility that specific forms were related to pre-burial functions. It is the intention of this chapter to consider the form of cremation urns in the context of pre-burial use.

The chapter begins with a review of previous approaches to the study of Anglo-Saxon vessel form, revealing that these studies have little or no theoretical grounding and place too much emphasis on single attributes. It will also be shown that there is no evidence to suggest that any of the form 'types' previously identified by analysts had any relevance to the people who created and used the pottery. Through a range of ethnographic examples, consideration is given to how modern pre-industrial pottery-producing and -using societies classify their pottery and the cognitive decisions that they make in identifying and naming types. The review demonstrates that their classifications are generally based on function, but that perceptions of proportion, in particular ratios of width-to-height and orifice diameter-to-maximum diameter, are of major concern when distinguishing between vessel types. With this review in mind a new typology of Anglo-Saxon vessel form is developed and presented. The chapter concludes by considering the properties of form alongside use-alteration evidence and identifies possible roles that certain vessel forms might have fulfilled in the production and consumption of fermented produce.

'Form' the Beginning

Like almost any study of Anglo-Saxon pottery, a review of form must begin with the work of J.N.L. Myres (1969; 1977). Much of Myres's work was concerned with the potential that pottery offered for supporting the Germanic invasion hypothesis; indeed, his primary aim was to draw decorative parallels with continental vessels, plot the distribution of these types throughout England, and thereby chart the progress of incoming ethnic groups (see below, Leahy 2007a and Richards 1987). Unlike his German counterparts, who had used form as the primary indicator of vessel date, Myres (1969, 24) argued against this approach, suggesting that it could 'prove fatal' to any attempt to classify the pottery produced in fifth- and sixth-century England. The assumptions on which he justified these claims, however, prove equally fatal to attempts to understand this pottery. He argued, for example, that the migrant potters 'were a chance assortment of uprooted amateurs' who would be 'unlikely to maintain a typological exactitude of form', and who applied decoration 'to any shape that might emerge from their unskilled efforts' (Myres 1969, 22-5). Furthermore, he believed that whilst the development of decoration could be traced throughout the fifth and sixth centuries, it would be foolish to expect potters to produce 'clear-cut ... well-defined ceramic types' that developed in an 'intelligible sequence of evolving forms' (Myres 1969, 22-25). Yet, as Richards (1987, 26) highlights, it is unclear why crossing the Channel should render the potters incapable of producing particular vessel types, or why form should stagnate whilst decoration flourished. Despite this dismissive attitude, consultation of Myres's (1977) *Corpus* reveals that he did in fact attempt to place each of the vessels into one of a number of morphological groups and it is worth considering how these groups were developed and used to classify pottery.

Given that decoration lay at the heart of Myres's taxonomy, the classification of undecorated pottery obviously posed a problem for him and, in the absence of decoration, he turned to form as a means of classification. It was in the second chapter of his 1969 volume *Anglo-Saxon Pottery and the Settlement of England* that he developed a typology and used it to classify the undecorated pottery. All subsequent grouping of decorated pottery was undertaken according to these types. Based on parallels drawn between English and continental pottery, Myres organised and dated the undecorated pots into the following types: biconical urns (fifth-century), hollow-necked urns (described as 'early'), sub-biconical urns (thought to have a 'long life'), shouldered urns (c.AD 500), bowls (considered 'early'), globular vessels (fifth- and early sixth-century), and low-bulbous forms (mid to late seventh-century) (Myres 1969, 25-8). Being founded entirely upon morphology, this approach is obviously at complete odds with his primary system of classifying and dating, clearly contradicting his statement that it would be unlikely that there would be a 'sequence of evolving forms' (Myres 1969, 22-5).

The development of this classification proved difficult for Myres (1977, 1-2), indeed he reported that there were an 'infinite series of shapes' and that 'each of the main [form] groups merge imperceptibly into others' and as a consequence, many urns could easily be placed into more than one of his groups. For example, he classified urn 3258 as a *sub-biconical* urn with an everted rim, but 1403 as a *shouldered* urn with hollow neck and everted rim (Figure 3.1) (Myres 1977, Figure 94, urn 3258 and Figure 98 urn 1403). As these urns are of entirely the same shape, one is left wondering where sub-biconical urns end and shouldered urns begin. These problems say more about Myres's categorisation than the pottery itself and the lack of clarity in his taxonomy, which is the cause of such problems, can be readily demonstrated: biconical urns are said to have a 'less pronounced carination at or not far away from the mid-point of the profile', whilst hollow necked urns should be seen as a 'variety of the biconical type', and sub-biconicals 'derive' from the biconical and hollow necked types (Myres 1969, 25-8). Consequently, in the absence of a well defined system the whole approach becomes highly subjective and subsequent analysts are left to decide for themselves what might, for example, constitute a 'typical' sub-biconical urn (Richards 1987, 27).

Further critiques of Myres's methodology have revealed that he placed too much emphasis on individual attributes. Indeed, Dickinson (1978, 333) demonstrates that he grouped together vessels that – but for the fact that they all possess foot-rings – bear absolutely no resemblance to one another. It is argued here that this is not an isolated instance, but that his whole typology of form placed too much emphasis on a single attribute – the shape and position of a vessel's shoulder. For example, consider urn 632 (Figure 3.2), a '*biconical urn* with wide mouth and everted rim' and compare it to urns 3402 and 2319, a '*sub-biconical* urn with tall narrow neck and everted rim', and a '*biconical urn* with narrow neck and everted rim' (Myres 1977, 192-4, 211, Figures 128 and 151, emphasis added). Although 632 and 2319 both have 'biconical' profiles, it is quite clear that 2319 has more in common with 3402 than it does 632, its biconical counterpart.

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Figure 3.1: Urns from Myres' Corpus, numbers 1403 and 3258, both from Loveden Hill, Lincolnshire. In the lower image, the urns have been scaled to the same size and superimposed on one another. This clearly demonstrates that whilst being of slightly different sizes, these urns are exactly the same shape, yet Myres describes 1403 as being 'shouldered', with a hollow neck, and 3258 as being 'sub-biconical' (Myres 1977, Figures 94 and 98).

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Figure 3.2: Urns 632, 2319 and 3402 from Myres's *Corpus*. Myres describes 2319 as a '*sub-biconical* urn with tall narrow neck and everted rim', 3402 as a '*sub-biconical* urn with tall narrow neck and everted rim' and 2319 a '*biconical urn* with narrow neck and everted rim' (emphasis added) (Myres 1977, 192-4, 211, Figures 128 and 151).

In contrast to Myres's largely intuitive approach, Fennel (1964) and Hills (1976, cited in Richards 1987, 30) attempted to provide a classification based on well-defined criteria and measurable attributes. Fennel (1964, 225), for example, records that '[t]erms such as "globular", "biconical", "wide-mouthed", "baggy", and "bowls" are used, seldom with any definition of what these terms really mean ... [and that these] need objective definition if they are to be universally valid'. Consequently, he reports that a vessel should be classified as biconical 'when the change of diameter is at about the mid point of the height', shouldered, 'when the change of direction is above the mid point of the height, or baggy, when the 'main diameter [is] below the mid point of the height' (Fennel 1964, 225-7, 263-7). He adds weight to this classification by using Shepard's (1956) morphological ratios to describe vessel profile. Indeed, from a range of measurements he determined the mean 'mouth' and 'height' ratios (ratio of mouth diameter to maximum diameter of the vessel and the ratio of height to maximum diameter, respectively) of plain, linearly, and stamp decorated pottery, then used these means to define the 'typical' types. A 'jar', for example, is a vessel with a height ratio of 0.9 or above, whilst a 'tall vase' has a height ratio greater than 1.1. A 'wide-mouthed bowl' is vessel with a height ratio less than or equal to 0.8 and a mouth ratio greater than or equal to 0.7 (Fennel 1964, 225-7, 263-7).

Fennel's approach to this material is clearly more rigorous than that of Myres', but it is not without its problems. For example, Fennel categorises vessels as 'globular' whilst never actually defining what this means and he also makes use of defining 'cut-off' values without critical appraisal. Indeed, Loveden Hill urns A9/249 and 26 are clearly not the same form, yet according to Fennel, and his ratios, both are 'bowls with standard mouths' (Figure 3.3) (Fennel 1964, 302, Figure L.9). As Rice (2005, 216) notes, such problems are a common occurrence in the classification of vessel form when definitions are applied rigidly. Despite these problems, Fennel's results suggest some interesting relationships, such as links between form and the presence and type of decoration (Fennel 1964, 267, 294). Unfortunately, this avenue of research was not pursued and the remainder of his thesis proceeds *á la* Myres, with the drawing of continental parallels, application of dates and charting of the progress of the Anglo-Saxon settlement in southern Lincolnshire.

Figure 3.3: Urns 26 (top) and A9/249 (bottom) from Loveden Hill (Lincolnshire). According to Fennel, these urns are both 'bowls with standard mouths' (redrawn from Fennel 1964, Figure L9).

In common with Fennel,Catherine Hills, in her doctoral study of urns from Spong Hill, attempted to classify urns according to measurable characteristics (Hills 1976, cited in Richards 1987, 30). For example, if an urn's maximum diameter is approximately half the maximum height and its height is less than or equal to the maximum diameter, then she suggested that it should be classified as a 'normal' urn. Similarly, if a vessel's maximum diameter is above its mid-height then the vessel is said to be 'shouldered', but if it is below it was said to be 'baggy' (Hills 1976, cited in Richards 1987, 30). Clearly, both Hills and Fennel were using the nomenclature and typology developed by Myres, but they provided future analysts with a means to classify according to defined attributes. Nevertheless, one must still ask to what end do these systems have significance? Indeed, as Rice (2005, 284) notes, archaeological types should reproduce as closely as possible the *folk classifications*, that is the classificatory system employed by the people that created and used the pottery. Yet, the categorisations of Myres, Hills and Fennel were constructed entirely by the analysts themselves, with no evidence to suggest that their classifications had any relevance to the Anglo-Saxon society that created and used the pots. For example, was it more important to an Anglo-Saxon individual when they were selecting a pot for a particular use that urns 2319 and 632 have biconical profiles (Figure 3.2), or that urn 2319 is more alike in overall form to urn 3402?

Perhaps the most rigorous and enlightening studies of Anglo-Saxon vessel form were those undertaken by Richards (1982; 1987). Unlike previous approaches to morphology, rather than attempt to (re)define Myres's types, or force vessels into groupings, he used statistical methods to investigate the relationship between both form and decoration of cremation urns and also form and the individual that the urn contained. Using Principal Component Analysis (PCA) he studied 100 vessels from Spong Hill and 68 from Mucking, identifying three morphological ratios which accounted for 93% of the variability in form (for a full discussion of the PCA approach to morphological study, see Richards 1982). He reported that Ratio 1, the 'width ratio' of a vessel, accounted for 79% of the variability in form and can be described as follows:

$$\frac{\text{Maximum diameter}}{\text{Height}} \qquad \text{(Ratio 1)}$$

‘Wider’ vessels have a large ratio value, whilst narrow vessels have a smaller ratio value (it should be noted here that this ratio is the mathematical reciprocal of Fennel’s ‘height’ ratio, thus, for Fennel, wider vessels are indicated by a low value). The second most significant characteristic describes the ‘shoulderedness’ of a vessel. It accounts for 9% of the variability and is expressed by Ratio 2:

$$\frac{\text{Height of maximum diameter}}{\text{Height}} \qquad \text{(Ratio 2)}$$

‘Shouldered’ vessels have a large ratio value whilst those with a low value are said to be ‘baggy’. Finally, Ratio 3 describes the level of neck restriction and accounts for just 5% of variability:

$$\frac{\text{(Maximum diameter - Rim diameter)}}{\text{(Height - Height of maximum diameter)}} \qquad \text{(Ratio 3)}$$

Those vessels with a low Ratio 3 value are said to be ‘open mouthed’, whilst ‘restricted’ vessels have a higher value. Despite accounting for only 5% of the variability in vessel form, it was this ratio which demonstrated ‘[t]he greatest number of significant associations between particular shapes and other attributes of the cremation’ (Richards 1982, 36-44). It would appear, then, that the accessibility of a vessel was extremely important in the selection of a vessel appropriate for the deceased. This is significant because, although Fennel calculated a similar characteristic – the ‘mouth’ ratio – the neck restriction has never been at the forefront of any studies of early Anglo-Saxon vessel form, yet ethnographic studies demonstrate that it is often a major concern in determining the functional suitability of a vessel (Rice 2005, 241; see below).

Through this ratio-based approach, Richards revealed that both the decoration of cremation urns (like Fennel 1964, see above) and the ages and genders of the individuals that they contained could be directly related to form. For example, diagonal lines, or chevrons, occurred less frequently on urns with high shoulders (high Ratio 2), but more commonly on low and mid-shouldered urns (low Ratio 2). Similarly, curvilinear decoration occurred more commonly on wider vessels (high Ratio 1), whilst stamps were more common on narrower urns (low Ratio 1) (Richards 1982, 43-4). Frequently, taller vessels were found to contain the remains of adults, yet children were more commonly found in shorter vessels. Males were concentrated in vessels with large maximum diameters, while women were found more frequently in vessels with above average rim diameters (Richards 1987, 134-9).

More significant than the correlations identified between individual ratios and particular styles of decoration, and/or the age and gender of the persons contained within the vessels, were those relationships identified when ratio values and other characteristics of vessel form were combined. For example, whilst infants and children were buried in small pots (i.e. lacking in height), infants were distinguishable within this group by being more commonly buried in open mouthed pots (low ratio 3). In contrast, older adults were more commonly associated with narrow pots with restricted necks (low Ratio 1 *and* high Ratio 3 value), whilst brooches, which are not associated with any particular age or gender, are significantly linked to vessels with high shoulders (irrespective of the actual vessel height). There appears, then, to be a direct relationship between specific skeletal groups, grave goods and the *overall vessel form* (Richards 1987, 150-4). Unfortunately, Richards failed to provide visual examples of 'typical' types and future analysts are left to deduce for themselves how these ratios combine into a visual representation of form. Nevertheless, such findings provide us with a window on the Anglo-Saxon perception of vessel form and these findings are clearly at odds with Myres's suggestion that studies in vessel form would be 'fatal' in any attempt to understand the pottery of the early Anglo-Saxons.

Finally, in this review of Anglo-Saxon urn form we must consider the work of Kevin Leahy (2007a). Following on from Myres's attempts at dating undecorated vessels, Leahy considered whether form could be used as a chronological marker. After calculating Richards's ratios for each of the Cleatham urns that were 'demonstrably deposited at the same time', Leahy concluded that these urns '*were often of different shapes'* and it is therefore unsafe to use vessel form in attempts to understand phasing and chronology (Leahy 2007a, 73-4, emphasis added). This observation should not be taken as defeat, indeed its significance extends far beyond studies of chronology and can only be appreciated when one takes into consideration the pre-burial uses of cremation urns and the fact that vessel form is often directly related to function (Rice 2005, 225-6, 241).

The foregoing discussion focused on studies of funerary pottery, but given that cremation urns appear to have been selected from a domestic context we must also consider those studies which have examined the form of pottery recovered from settlements. A brief review of published material reveals that detailed appraisals of form are rarely undertaken and consequently any attempt at classifying the pottery from settlements largely follows the naming developed by Myres (e.g.West 1985). There are exceptions, however, and these are worth considering. Hamerow's typology of the form of pottery recovered from the settlement of Mucking was, in many ways, more robust than those which have examined pottery from cemeteries. Using proportions such as the ratio of height to rim diameter, as well as the profile and location of maximum diameter, she developed a dendrogram of form that allowed hierarchical categorisation of shape (Figure 3.4). Her dendrogram immediately divided pots into jar and bowl forms, with bowls being defined as vessels with a rim diameter greater than their height, and jars as those with a rim diameter less than the total height (Hamerow 1993, 40). Jars were then categorised as biconical, globular, shouldered, straight-sided ovoid and low bulbous, whilst bowls were split into simple and complex forms. Evidently the names she used to describe shape were those developed by Myres (Hamerow 1993, 40), but unlike Fennel and Hills, Hamerow did not attempt to define these terms rigidly (but see below). Instead, examples of typical types were provided by reference to particular vessels, the dendrogram, and the type-series summary; for example, globular jars were described as '[r]estricted, usually necked, complex profile; max girth lies roughly at the centre point; rim diameter min 57 [mm], max 360 [mm], average 151 [mm]' (Hamerow 1993, 40-1).

Although Hamerow's outlines provided analysts with a clearer idea of what constitutes a typical form-type, there are considerable problems with her classification. She identified restricted vessels, for example, as those with an orifice diameter less than the maximum diameter, whilst unrestricted vessels had an orifice diameter greater than the maximum diameter. Confusion arises, however, as some vessels were described as 'slightly restricted' (Hamerow 1993, 40). This could have been avoided if Richards's Ratio 3 or Fennel's 'mouth' ratio had been considered, however it should be acknowledged that their absence is probably due to the fragmentary nature of settlement pottery, and the difficulty that this causes in obtaining accurate measurements that would allow the calculation of ratios. Further problems can be seen by returning to the globular jar outline presented above. With such a range of rim diameters one would expect that the smallest derive from smaller versions of the largest jars, yet as Figure 3.5 shows, this is not the case. Both pots meet the globular jar criteria, yet they are clearly *not* the same form. The same failing has already been highlighted in Myres's typology (see above) and as Hamerow's forms are based on those developed by Myres it is no surprise to find the problem replicated here.

Figure 3.4: Hamerow's dendrogram for classifying the form of pottery recovered from the settlement of Mucking (Essex) (Hamerow 1993, Figure 24).

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Figure 3.5: Globular jars from the settlement of Mucking. Vessel 138.3 (right) is described as a 'globular jar with rounded base', whilst 139.2 (left) is described as a 'globular jar with exceptionally thin, even walls' (Hamerow 1993 Figures 138.3 and 139.2). However, there are clearly significant differences in their forms. Also note that the lower walls of 138.3 are internally pitted, indicating that it contained lactic acid-fermented produce.

A further problem with Hamerow's typology can be found in her over-defining of biconical and carinated bowls. She expended considerable energy in attempting to identify a mathematical indicator that differentiated between the two, concluding that if the internal angle at the maximum diameter of a vessel is less than or equal to 120°, then the vessel should be classified as carinated; biconical vessels, on the other hand are said to have an angle greater than 120°. Yet, as Blinkhorn (1997, 121-2) explained, analysis carried out by Hamerow to determine whether this 120° division had any statistical significance revealed that there was *no* valid reason for using this divisor to distinguish between the two categories. Despite this she continued to classify vessels as one or the other and plot their spatial distributions across the settlement site (Hamerow 1993, 40-4).

Summary

As this review reveals, almost all approaches to the form of Anglo-Saxon pottery begin by classifying the position and shape of the shoulder, with the rims, necks and bases being seen as secondary characteristics. Such an approach is extremely detrimental to our understanding of form as it places considerable weight on a single characteristic, detracting from the importance of *overall* vessel form. Moreover, these shapes are often very loosely or over defined and despite continual criticism of Myres's methodology, analysts repeatedly base their form types on those that he developed. Accordingly, typologies often suffer from the same problems inherent in Myres's taxonomy. It is unsurprising, therefore, to find that the most enlightening analyses of form are those undertaken by Richards (1982; 1987) who did not attempt to recycle Myres's typology, but started from scratch, allowing measurements and morphological ratios to direct his research. This is a particularly significant observation, as ethnographic studies demonstrate that it is often the combination of these ratios which guide a person's perception of a 'typical' vessel type (see Rice 2005, 280 and especially Kempton 1981; discussed further below). Unfortunately, Richards did not show how these ratios combine to form typical types and we are still, therefore, ignorant of the overall categories that exist.

Clearly a new approach to the study of Anglo-Saxon vessel form is needed and it is the aim of this chapter to develop and interpret a new taxonomy in light of the specialist processes suggested by the use-alteration analysis presented in Chapter 2. The following section considers a range of ethnographic studies that have specifically explored the ways in which pottery producers and users categorise and classify their own pottery, demonstrating that the features that have dominated the study of Anglo-Saxon vessel form are often secondary concerns that can be described as local and regional variants of much wider themes. In particular the chapter focuses on the cognitive decisions that pottery producers and users make when distinguishing between types.

Form: through the eyes of the living

Figure 3.6 shows six water jars produced by six potter communities in six villages in the Luo region of Kenya (Herbich 1987, Figure 2). If a Myres-based system was used to classify these vessels, with the emphasis being placed on whether vessels are rounded, biconical or shouldered, we immediately see that this would ignore their common features, divorcing them from one another and from their intended uses. For example, vessels 1-4 all have similar heights and widths, all have restricted necks and all would be classified as globular by Myres. Moving on to vessels 5 and 6, although they both have restricted necks and are of similar height and width, they would be identified as rounded (vessel 5) and shouldered (vessel 6). Thus, despite the fact that they have exactly the same function, similar rims, necks and overall volumes, a Myres-based system would classify these six vessels as three different types. Such variation is not restricted to the Luo's water pots; indeed, the Luo produce thirteen distinct vessel types, and whilst no community makes all thirteen (they usually make about nine), each functional type that is made by multiple communities varies slightly from community to community (for example, beer drinking pots, Figure 3.7). Ingrid Herbich (1987, 195-6) terms these localised variations 'micro-styles'. She stresses that these micro-styles should not be seen as adaptations of a 'common ideal form'; rather, they are 'the result of different local conceptual traditions', which develop out of the learning patterns, motor habits, social relationships and *habitus* of the potters who produce them and the consumers who use them (Dietler and Herbich 1989; 1994, 464; Herbich 1987, 195-6;). As the following discussion demonstrates, micro-style variation is not a phenomenon restricted to the Luo.

Figure 3.6: Water storage jars produced by six different potter communities in the Luo district of Kenya. Despite all serving the same function, a Myres-based classification of these vessels would categorise then as globular (1-4), rounded (5) and shouldered (6) (Dietler and Herbich 1998, Figure 10.2).

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Figure 3.7: Beer drinking pots produced by two different potter communities in the Luo district of Kenya. Despite the slight differences in form these two types of vessel are used in exactly the same way and in the same social context (Dietler and Herbich 1989, Figure 3).

Before 1980, the potters of the Kalinga village of Dalupa (Philippines) (Figure 3.8) manufactured globular water jars, whilst potters in the nearby village of Bontoc manufactured vessels with a shoulder. After coming into contact with Bontoc potters, the Dalupa began to make water jars with shoulders. Although this new form was given its own name, *Binontoc*, in the eyes of the Dalupa it was exactly the same *type* of pot. At about the same time the Dalupa potters also changed their style of cooking vessel from one with a rounded profile to one with a carination; this was introduced after contact with potters from the Tanudan River, c.14km away (Figure 3.8) (Stark 1999, 39-40, Figures 3.4 and 3.5). Again, but for their slightly differing profiles, these vessels are exactly the same type of pot. Had they been studied in the way that early Anglo-Saxon pottery has been studied, then the water jars would be divided in to globular and shouldered forms, whilst the cooking pots would be separated into globular and carinated. We would therefore be considering three different types, when in fact there are only two functional classes.

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Figure 3.8: Pottery produced by Kalinga of the Philippines. Right, globular and shouldered water jars produced by potters from the village of Dalupa. Left, the shapes of cooking pots produced by Kalinga potters living in villages around the Chico River (Stark 1999, Figures 3.4 and 3.5).

A similar situation is observed by considering *tinaja* from Guatemala. All *tinaja* follow the same basic form, having large volume bodies, restricted necks, slightly flaring rims, and two or three handles, and all fulfil exactly the same function – carrying water (Figure 3.9) (Reina and Hill 1978, Map 10). Again, a Myres-based analysis would not classify these vessels by their common attributes but by the fact that they are shouldered, globular and rounded. Similarly, potters on the islands of Wari, Tubetube and Bonabona, in the Milne Bay Province of Papua New Guinea, all produce a general cooking pot known as a *gulewa*. The Tubetube and Bonabona *gulewa* are shouldered, whilst the Wali *gulewa* have a smooth hemispherical profile (May and Tukson 2000, 82-87, 99-101). But for the contour of the shoulder, these pots are all of the general size and shape and all serve the same function. Once more a Myresian analysis would categorise these vessel as two separate types rather than micro-style variants of the same form (Figure 3.11). Finally, micro-style variation is observable in the profile of *kunda*, a type of water jar produced by the Dangwara potters in the Malwa area of India and in the Udaipur in Rajestan. Although both group's *kunda* serve the same function, the former's have a curved profile whilst the latter's are straight sided (Miller 1985, 61-2).

Figure 3.9: Differences in the forms of *tinaja* produced by potters living in different areas of Guatemala. All *tinaja* follow the same basic form, having large volume bodies, restricted necks, slightly flaring rims, and two or three handles. All fulfil exactly the same function – carrying water (Reina and Hill 1978, Map 10).

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Figure 3.11: Cooking pots (*gulewa*) produced in the Milne Bay Province of Papua New Guinea. *Gulewa* produced by potters living on the islands of Tubetube and Bonabona are shouldered (top), whilst those produced by potters living on the island of Wali have a smooth hemispherical profile (bottom) (May and Tukson 2000, 82-87, 99-101, Figures 4.27 and 4.56).

The above examples demonstrate that, by classifying according to the shape and position of the shoulder, vessels with exactly the same function are repeatedly divorced from one another, whilst others with completely different functions might be drawn together. For example, the Dalupa's water jars would be placed alongside their cooking pots on account of their globular profiles. Reconsidering early Anglo-Saxon pottery in light of the evidence presented, then, suggests that although Myres saw urns 2319, 3402, 632 and 1571 (Figures 3.2 and 3.12) as three different forms, 'sub-biconical', 'biconical' and 'shouldered', what we actually have is just two forms, one with a wide mouth (low ratio 3) and a width considerably greater than the height (large Ratio 1) (632 and 1571) and the other with a narrow restricted neck (high Ratio 3 value), where the width and height are approximately equal (i.e Ratio 1 ≈1.0) (2319 and 3402). That they are shouldered, biconical or sub-biconical is of secondary concern; this is purely micro-style variation.

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Figure 3.12: Example of a 'shouldered' cremation urn illustrated in Myres's *Corpus* (Myres 1977, Figure 208).

Support for the idea of micro-style variation in Anglo-Saxon England is provided by Blinkhorn's (1997) study of lugged cooking vessels, a rare but almost universal find on sites in England and on the continent. Lugs allow pots to be suspended above a fire, and they may be applied on or just above the shoulder of the vessel, or pierced through the wall just below the rim; further variation may include an applied footring. Blinkhorn (1997, 123) argues that neither lug type is functionally more efficient than the other, nor do footrings offer any advantage over their un-footed counterparts (in fact, the addition of the extra clay which forms the footring actually increases the chance of breakage by thermal shock). As footed vessels with lugs are found on sites throughout the 'Germanic homelands' but are rarer in the 'Jutish' areas, he proposes that these variants are the product of the *habitus* of different societies (Blinkhorn 1997, 123). That is to say, those peoples living in most areas of the 'Germanic homelands' were making vessels with footrings because that was the way that they had learned to make them. They did not question whether a footring should be applied or not as the process of learning and manufacture had instilled in them a set of learned dispositions which ensured that the application of a footring was an unquestioned, unconscious, habitual process. In contrast, the learning patterns, motor habits, and social relationships of the potters in the 'Jutish' regions ensured that they did not produce vessels with footrings. In essence, like the ethnographic cases presented above, the presence/absence of footrings or the position and form of a suspension lugs are micro-style variants that result from societies' different conceptual traditions of how a pot should be made.

A common theme running through the ethnographic examples discussed above is that micro-styles correlate with social groupings and geographical areas. That is not to say that people are manipulating form as a means by which to overtly express social identity; rather, as was discussed previously, these differences in form are 'the result of ... local conceptual traditions', which develop out of the learning patterns, motor habits, social relationships and *habitus* of the potters who produce them and the consumers who use them (Herbich 1987, 195-6). As the Dalupa case demonstrates, these micro-styles are not static, but dynamic, being influenced by cultural contact and social interactions (see also Dietler and Herbich 1998 for assimilation and development of style amongst the Luo). These points are particularly salient for our study of Anglo-Saxon cremation urns. Indeed, as the cemeteries under study are essentially centralised depositories, bringing together pottery from a number of settlements, they are a physical record of the micro-styles that were introduced, existed and evolved through the interaction of peoples during the fifth and sixth centuries.

Methods for classifying the form of early Anglo-Saxon pottery clearly require a critical overhaul. Crucially, if we are to fully understand the form of this pottery, we must begin by producing a typology that is not centred on the contour and position of the shoulder. As Kluchohn (1960, cited in Rice 2005, 276) explains, in order for a typology to be regarded as more than just another set of groupings it must be theoretically based, with all of the analyst's types reflecting as closely as possible the ideas that the potters had in their minds when they made their vessels. Of course, we cannot ask Anglo-Saxon potters how their pots were classified, but we can begin to understand how they might have done this by considering how pots are classified ethnographically, specifically the naming systems, or *folk classifications*, employed by non-industrial pottery-producing and -using communities (Rice 2005, 277-82). Prudence Rice (2005, Chapter 9) has examined in detail how archaeological approaches to typology compare to the folk classification employed by non-industrial societies. She considered an extensive body of ethnographic data to explain how pottery producers and users classify their vessels and as such the following case-studies and arguments are largely an elaboration on Rice.

The Folk Classification of Ceramics

One of the most striking features of cross-cultural surveys of pottery naming is that users and makers assign names to vessels according to intended use (Rice 2005, 278;

Longacre 1981, 53). For example, Table 3.1 shows the names employed by the Kalinga (Philippines) for a range of domestic pots. While there is some overlap between different sizes, names are largely confined to the intended use; for instance, three sizes of vegetable/meat cooking pot may all be known as *oppaya*, whereas the three sizes of rice pot may all be termed *ittoyom* (Longacre 1981, 53-4). Although the different sizes of water jar are given separate names which qualify their size, again this distinction is seen to relate to function; the smaller of the two is used to teach young girls to carry water. A similar situation can be seen in naming system employed by the Diola of Senegal; here three sizes of cooking pot are all known by the name *ebiregai*, whilst, despite sharing the same globular shape, the three sizes of water jar each have different functions and are consequently given different names (Figure 3.13) (Linares de Sapir 1969, 8).

Figure 3.13: Water jars produced by the Diola of Senegal. Each of the three sizes of vessel fulfils a different function. The smallest is known as an *erumbai* and is used for pouring liquids, the medium vessel is used for carrying water and is called an *efagei*, whilst the largest is known as a *kubikek* and is used for storing water (Linares de Sapir 1969, 8).

The Manumanu of Papua New Guinea produce four types of pot: the *uro*, a wide-mouthed, spherical cooking pot measuring c.10-16 inches in diameter; the *hodu*, a narrow-necked, spherical water vessel, c.12-18 inches in diameter; the *nau*, a circular, shallow, open dish ranging from c.12-20 inches in diameter, and the sago storing *tohe*, a large open-mouthed spherical pot of exactly the same form as the *uro* but several times larger (Groves 1960, 10). Once more we see that a range of vessel sizes may be given the same name and that classification is based primarily on function. Function is again at the heart of the folk classification of the pottery in the Kathmandu Valley (Nepal). Indeed, despite being produced in a range of sizes, all cooking pots share the same name (*hāndi*), pickle jars are all known as *acharkuli*, regardless of their shape or size, whilst *anti* is given to a multitude of vessels used to pouring small amounts of liquid such as water or wine (Birmingham 1975, 384). Finally, size qualifiers are seen to be attached to vessels produced by the Shipibo-Conibo (Peru), but again the root of the classification is the function (DeBoer and Lathrap 1979, 105-10).

Use	**Small size for one or two people**	**Regular, for four to six people**	**Large size**	**Very large**
Rice cooking	*Oggatit Ittoyom*	*Ittoyom*	*Lallangan Ittoyum*	
Vegetable/meat cooking	*Oggatit Oppaya*	*Oppaya*	*Lallangan (oggan) Oppaya*	*Challay*
Water jar	*Im-immosso* (used by young girls to learn to carry water on their heads	*Immosso*		
Wine jar	*Volnay* (small, globular shape)		*Amuto* (conical in shape)	

Table 3.1: The naming system of pottery employed by the Kalinga of the Phillipines (after Longacre 1981, Table 2.1).

As these examples demonstrate, the features that Anglo-Saxon archaeologists tend to focus on as a means to classify pottery, such as body contour, are not at the centre of the folk classificatory systems. Given the need for a new taxonomy of Anglo-Saxon vessel form, we may look on this with dismay and wonder how we are ever to produce a classificatory system close to that of the Anglo-Saxons themselves. Yet, as Rice (2005, 279) notes, the situation is not a bleak as it may at first appear; indeed, although detailed studies of ethnotaxonomy are rare, those that have been undertaken do suggest that classifications are reproducible without prior knowledge of vessel function, the producers, or their mode of organisation. Specifically, these groupings may correlate with 'precise measurements or ratios of vessel sizes and proportions' (Rice 2005, 279).

In his ethnographic study of the of the classificatory system employed by pottery producers and users in the State of Mexico, Willet Kempton (1981) revealed that although function was used to describe types, ratios were an extremely significant concern in the delimitation and determination of particular functional classes. Kempton found that if informants were asked to provide verbal definitions of specific functional types, they were either reluctant to do so, or rather they were unable to articulate what made an *olla* an *olla*, for example, or a *jarro* a *jarro*. Instead, they preferred to present him with typical examples taken from their own home or sketch one out. If verbal definitions were attempted these were inevitably related to function or the presence of added functional elements such as spouts or handles (Kempton 1981, 35-7). For example, according to informants the only difference between a *jarra* (pouring vessel) and a *jarro* (drinking vessel) is that a *jarra* possesses a spout but a *jarro* does not (Kempton 1981, 36-9). However, when a particular informant was presented with a range of spouted and un-spouted vessels she categorised one as a '*jarro* with a spout'. When questioned about this inconsistency she revealed that it was too fat to be a *jarra*. This 'fatness', or 'width-to-height ratio', requirement was never mentioned by any of his informants, but it was found to be pivotal in their classification of all vessel forms. For example, both *olla* and *florero* (cooking pots and vases, respectively) may have two handles or none at all, yet his informants distinguished between the two on account of their width-to-height ratio; 'thinner' vessels are considered to be *florero*, whilst *olla* are much 'fatter' (Figure 3.14) (Kempton 1981, 43-9, 77-81).

Longacre (1981, 54) investigated the significance of vessel ratios further and actually calculated characteristic values that distinguish between types. As discussed, the native classification of Kalinga vessels is primarily based upon intended use (Table 3.1). Longacre suggested that, as there are a range of shapes and sizes among the different types, as well as other features that are related to the functional class, it might be possible for a non-Kalinga to 'discover' the native types without prior knowledge of their indigenous systems. For example, their rice cooking pots tend to be taller and narrower than the meat/vegetable cooking pots and, as they are used with a cover, they have a relatively restricted orifice and a slightly steeper and longer rim. Measurements taken from a sample of 161 meat/vegetable and 107 rice cooking pots revealed that meat/vegetable pots have an average height-to-width ratio of 0.78 whilst the rice pots have an average ratio of 1.02. Similarly, the average rim angle for the rice cooking pot is 48.2°, whilst the meat/vegetable pot is 44.0°. This led him to conclude that '[u]sing metric data, one could indeed replicate the native system' revealing '*functionally significant categories*' (Longacre 1981, 54, emphasis added).

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Figure 3.14: Sample results from Kempton's investigations into the classification of vessel form. A range of pictures of pots (top left) were presented to informants, who were then asked to identify the types of vessels that they saw. Informants frequently identified the 'thinner' vessels in columns 1 and 2 as *florero* (top right – note the frequency contours), whilst the 'fatter' vessels, in rows C, D and E of columns 4, 5, and 6, were most commonly identified as being *olla*. The 'fatness' or width-to-height ratio is clearly a significant concern in distinguishing between types (Kempton 1981, Figures 2.3, 3.9 and 3.10).

Although Longacre demonstrates that it is possible to determine vessel types mathematically, Kempton's work reiterates the danger of applying definitions too rigidly. Kempton's study suggests that classifications are based upon a model of prototypes and graded extensions. This model reveals that people identify objects by means of typical or ideal types, but within their identifications there are extensions; that is, objects which are not the ideal but by their attributes and dimensions are still essentially jars and not bowls, for example, (Kempton 1981, 18-23; Rice 2005, 280). In an attempt to determine prototypes and limits of these extensions Kempton showed his informants 576 illustrations of vessels and asked them to name the types represented. They were then asked to identify examples of each particular type, the 'best' examples of that type (the prototype) and those vessels that are 'more or less' that type (the graded extensions) (Figure 3.15). Significantly, he noted that although certain vessels were more frequently identified, no particular example was universally recognised by his informants as the ideal of that form. Moreover, the prototypes and boundaries of graded extensions were seen to vary according to age, gender and social status (Kempton 1981).

Figure 3.15: One informant's 'prototypes' and 'graded extensions' of the *jarro* vessel form. Those vessels within the solid line were identified as being *jarro*. Those which are shaded black were considered the best examples of a *jarro* – the 'prototypes'. Those within the dotted line were thought to be 'more or less' a *jarro* and thus they are the 'graded extensions'. Vessels outside of the dotted or solid lines were identified as being other types (Kempton 1981, Figure 4.5).

Like Kempton and Longacre, Labov's (1973, 352-9) study of the naming of types revealed the significance of the ratio of width-to-height but it also echoed the danger of rigid classification. Labov showed students from two American universities a range of vessels and asked them to name them. When shown cups with varying width-to-height ratios (Labov calls this the width-to-depth ratio) all agreed that vessels were cups when the ratio was 1 or 1.2 to 1(Figure 3.16, vessels 1 and 2); most accepted them as cups when the ratio was 1.5 (Figure 3.16, vessel 3), but only 28% named cups when the ratio was 2.2 (Figure 3.16, vessel 4). Furthermore, when the ratio was c.2 to 1, his study group were equally as likely to name the vessel as either a cup or a bowl, clearly demonstrating that a single vessel may be at once be two different types – both a cup and a bowl (Figure 3.16).

Figure 3.16: The results of Labov's study into the naming of vessel types. Labov demonstrates that the ratio of width-to-height is an extremely significant concern for the users of pottery when they distinguish between vessels belonging to different functional classes. As the value of this ratio varied, his informants identified vessels 1-4 as either cups or bowls. His study highlights the dangers in producing and using rigid numerical boundaries as a means of classifying vessel forms (Labov 1973, Figures 5 and 6).

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Figure 3.17: Miller's study of Dangwara potters (India) highlights the danger in using rigid numerical boundaries in order to classify pottery. For example, we see that there is considerable variation in the range of rim diameters of oil lamps (*divaniya*) produced by six different potters from Dangwara village (left). In the scattergram on the right the mean mouth diameters of eleven different vessel types (made by the same six potters) are plotted against the mean maximum diameters (each point on the graph represents the average value obtained from ten vessels produced by an individual potter). Using these values we can see that the average ratio of mouth diameter to maximum diameter (Ratio 5) for the *tapeli*, for example, varies from c. 0.7 to 0.9 (Miller 1985, Figures 10 and 12).

Miller's (1985) work with the Dangwara (India) potters reiterates the danger of rigid numerical classification. Indeed, using the example of a single vessel type, the *divaniya* (oil lamp), he demonstrated that the range of rim diameters produced by six potters were normally distributed and that although they manufactured pots within an acceptable range, each potter produced vessels within different personal limits. The rim diameters of lamps produced by one potter (Potter D), for example, ranged from c.6-7cm, whilst those of another (Potter A) were between c.6-8cm (Figure 3.17) (Miller 1895, Figure 10). That there was considerable variation between the measurements, and therefore ratios, of vessels produced by individuals was further emphasised by his analysis of eleven additional types (Miller 1985, Figures 12-14). The ratio of mean mouth to mean maximum diameter of *tapeli* (a squat, open mouthed cooking pot), for example, produced by the same six potters ranged from c.0.7 to 0.9 (calculated from Miller 1985, Figure 12) (Figure 3.17).

From the above examples we can see that function, shape (in the form of ratios) and size are all significant concerns in the folk classification of pottery. The fact that ratios can and have been employed to determine functionally significant types is extremely encouraging for our attempts to re-categorise early Anglo-Saxon vessel form. Yet, if ratios are to be used we must be aware of the problems inherent in rigid numerical definition. As a range of ratios have already been used to describe the form of Anglo-Saxon pottery the following discussion examines whether these ratios may be used as a means by which to identify and distinguish between early Anglo-Saxon vessel types.

Painting by Numbers: Anglo-Saxon Urn Ratios

As previously discussed, both Fennel (1964) and Richards (1982; 1987) have developed and used a number of ratios to describe the form of Anglo-Saxon pottery. To test whether their ratios could, indeed, be used to distinguish between functionally significant types, and thus form the basis of a new classificatory system, these ratios were applied to vessels from known classification systems, namely the ethnographic groups described above. Measurements were taken from published illustrations of these ethnographic vessels, and Richards's Ratios 1 and 3 and Fennel's 'mouth to width' ratio (henceforth referred to as Ratio 5)[1] were then calculated for these vessels and compared.

Table 3.2 provides the ratios obtained for the Luo water jars and beer drinking pots shown in Figure 3.6 and 3.7. All water jars have very similar Ratio 1 values, as do the beer jars, but the mean Ratio 1 values of each of these types are sufficiently different to allow these types to be distinguished numerically; the mean Ratio 3 and 5 values also differentiate these two types. Separation of types by means of ratio values is again revealed by considering Gamo pottery (Table 3.2 and Figure 3.18). Here we see that the narrow-necked beer jar (*batsa* C) has a Ratio 1 value of 0.81, whilst the communal eating and storing bowl (*shele* F) has a Ratio 1 value of 1.17; again Ratio 5 helps to delimit these types more precisely. Of concern, however, are the values obtained for Ratio 3. Richards (1982, 44) suggests that this ratio describes how restricted the neck/mouth is, yet the *batsa* (C) is clearly restricted, whilst the *shele* (F) is open-

[1] Although Leahy's study of vessel form was based on Richards's ratios, he did calculate an additional ratio (Ratio 4) which he suggested expressed profile as a single figure. His Ratio 4 was not included in this analysis as it describes the angle and contour of the shoulder, which, as has been discussed, should be seen as 'micro-style' variation of much larger groups. Richards's Ratio 2 serves a similar function, in that it tells us how far up the vessel the shoulder is located. The inclusion of these ratios in the determination of groups, then, would, in fact, hinder our attempts.

mouthed, yet both have exactly the same Ratio 3 value. If this is not simply an anomaly, then we cannot use this ratio to determine types and there are serious implications for the validity of Richards's (1982; 1987, see above) studies of Anglo-Saxon vessel form; it is worth considering this phenomenon further.

Vessel	**Max Dia (cm)**	**Height (cm)**	**Height of Max Dia (cm)**	**Rim Dia (cm)**	**Ratio 1**	**Ratio 3**	**Ratio 5**	**Figure**
Luo Water Jars								
1	52	52	23	34	1.00	0.62	0.65	3.6
2	49	53	23	26	0.92	0.77	0.53	3.6
3	53	58	26	29	0.91	0.75	0.55	3.6
4	53	66	27	26	0.80	0.69	0.49	3.6
5	46	47	17	25	0.98	0.70	0.54	3.6
6	47	48	21	27	0.98	0.74	0.57	3.6
Average					**0.93**	**0.71**	**0.56**	
Luo Beer Drinking Vessels								
B	35	30	14	38	1.17	-0.19	1.09	3.7
C	36	33	17	40	1.09	-0.25	1.11	3.7
Average					**1.13**	**-0.22**	**1.10**	
Gamo Beer Jar and Serving Bowl								
C	60	74	38	31	0.81	0.81	0.52	3.18
F	54	46	25	37	1.17	0.81	0.69	3.18

Table 3.2: Ratio values calculated for ethnographic examples of pottery form. The values relate to those vessels shown in Figures 3.6, 3.7 and 3.18.

Figure 3.18: Gamo (Ethiopia) pottery. The large beer jar (*batsa*, C) and a communal eating and storing bowl (*shele*, F). Ratio values for these vessels are recorded in Table 3.2 (Arthur 2006 Figures 2.7 and 2.8).

To ensure this was not the result of using non-Anglo-Saxon types, eight Anglo-Saxon vessels were selected and their ratio values calculated (Table 3.3 and Figures 3.2, 3.12 and 3.19). Urns 2319, 3402, 1885 and 1636 (Figures 3.2 and 3.19) all have restricted necks and are of similar height, width and rim diameter. The only feature that divides them is the position and contour of their shoulders, which, as discussed, should be seen only as micro-style variation. Importantly, these four vessels all have very similar Ratio 1 and Ratio 5 values and these are clearly distinguishable from those obtained for urns 632, 1609, and 1571 (Figures 3.12 and 3.19). Consideration of Ratio 3, however, reiterates the problem highlighted. Vessels 3402 and 1609 have almost identical Ratio 3 values (0.82 and 0.81, respectively) (Figure 3.2 and 3.19), yet one is clearly open-mouthed and the other restricted. Similarly, according to Ratio 3, the open-mouthed 1571 could be placed alongside the restricted 312 (Table 3.3 and Figures 3.12 and 3.19).

Vessel	Max Dia (cm)	Height (cm)	Height of Max Dia (cm)	Rim Dia (cm)	Ratio 1	Ratio 3	Ratio 5	Figure
2319	56	60	32	26	0.93	1.07	0.46	3.2
3402	57	60	27	30	0.95	0.82	0.53	3.2
1885	58	55	26	25	1.05	1.14	0.43	3.19
1636	61	60	33	29	1.02	1.19	0.48	3.19
632	64	46	25	42	1.39	1.05	0.66	3.2
1609	61	46	25	44	1.33	0.81	0.72	3.19
1571	60	45	28	45	1.33	0.88	0.75	3.12
312	182	177	80	94	1.03	0.91	0.52	3.19

Table 3.3: The ratio values calculated for eight Anglo-Saxon cremation urns shown in Figures 3.2, 3.12 and 3.19. Numbers highlighted green and blue relate to vessels that have very similar Ratio 3 values, and allegedly the same level of neck restriction, but as the relevant figures reveal, this is clearly not the case. Numbers highlighted pink and grey demonstrate that Ratios 1 and 5 can be used to distinguish between two different classes of vessel from (although of different sizes) – the relevant figures must be consulted to appreciate this point (data derived from Myres 1977, Figures 105, 128, 151, 208, 225; Leahy 2007c).

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Figure 3.19: Selected urns from Myres's *Corpus* (Myres 1977, Figures 105, 128, 225) and Cleatham (Leahy 2007c). Ratio values for these urns are presented in Table 3.3.

This problem with using Ratio 3 is very concerning, as Richards stated that it was the most significant ratio in terms of identifying correlations with other aspects of the Anglo-Saxon cremation rite (Richards 1982; 1987, 33-44). Clearly, an apparent relationship between, for example, the gender of an individual and the Ratio 3 value (restrictedness of the neck) of the urn in which they were buried cannot be considered real if both restricted and unrestricted vessels share the same value. It is important, therefore, to gain an understanding of how this problem arises; this is best explained by consideration of a hypothetical case study. In Figure 3.20 we see that, except for the position of their shoulder, Vessels A and B are in every respect the same type of pot; they have the same rim diameter, height, maximum diameter and base. If we examine their ratios we see that Ratios 1 and 5 are exactly the same, but Ratios 2 and 3 are considerably different. For Ratio 2 this is not a problem, indeed, it tells us, as it should, that one has a higher shoulder than the other (an example of micro-style variation); for Ratio 3, however, it is disastrous. This ratio should describe the restrictedness of the neck/orifice, which is the same for each urn; the only factor that is different is the height of the shoulder. If Ratio 3 truly describes the restrictedness of the neck then both vessels should possess the same Ratio 3 value, yet their respective Ratio 3 values describe Vessel A as being restricted and Vessel B as being open-mouthed![2]

The best indicators of Anglo-Saxon vessel form are, therefore, Ratios 1 and 5. As such, these two ratios will be the main numerical considerations in the determination of the new taxonomy. It is encouraging, then, that both Longacre and Kempton found that the width-to-height ratio (Ratio 1) was the most significant in distinguishing between functional classes in their ethnographic studies of pottery classification (see above); it is also this ratio which, according to Richards (1987, 33-44), accounts for the greatest variation (79%) in Anglo-Saxon vessel form. Moreover, as Rice (2005, 212, 241) notes, the characteristic most often modified or adapted to meet distinct functional

[2] It is possible to see how this problem occurs by considering the way that Ratio 3 is obtained:

$$\frac{\text{(Maximum diameter - Rim diameter)}}{\text{(Height - Height of maximum diameter)}}$$

As both Vessels A and B have the same maximum diameter and rim diameter, both will share the same numerator (maximum diameter-rim diameter). On the contrary, as both are the same height, but the point of maximum diameter is lower on Vessel B than A, Vessel B’s denominator (height-height of maximum diameter) will be larger than Vessel A’s. Consequently, Vessel B has a smaller Ratio 3 value than Vessel A, indicating that Vessel A has a restricted mouth, whilst Vessel B is allegedly open-mouthed.

requirements is the orifice. It is reassuring, then, that Ratio 5, Fennel's ratio of mouth to maximum diameter, describes this characteristic.

Vessel A

Rim Diameter = 24cm
Maximum Height = 50cm
Maximum Diameter = 60cm
Height of Maximum Diameter = 30cm
Ratio 1= 1.2; Ratio 2 = 0.6; Ratio 3 = 1.8; Ratio 5 = 0.48

Vessel B

Rim Diameter = 24cm
Maximum Height = 50cm
Maximum Diameter = 60cm
Height of Maximum Diameter = 20cm
Ratio 1= 1.2; Ratio 2 = 0.4; Ratio 3 = 1.2; Ratio 5 = 0.48

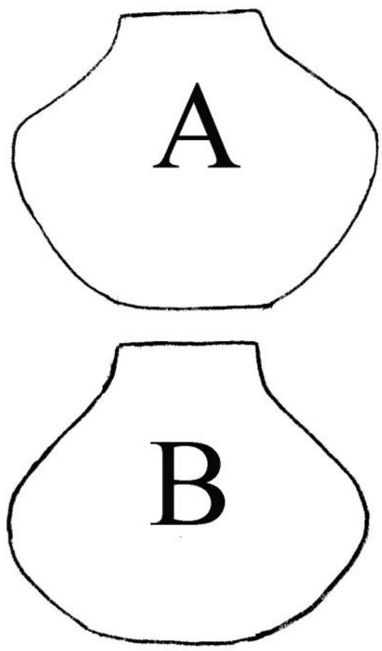

Figure 3.20: The Ratio 3 problem.

Size Matters

Clearly, then, ratios are useful in describing vessel form, yet we cannot rely solely on these to distinguish between Anglo-Saxon types. Indeed, we have already seen that size may be used to differentiate between functional classes which share the same form amongst the Kalinga, Shipibo-Conibo and the Diola (DeBeor and Lathrap 1979, 105-10; Longacre 1981, Table 2.1; Lines and Sapir 1969, 8) and it is worth considering how size might affect functionality and thus the classification of Anglo-Saxon types. Looking at the Gamo's beer mug (*tsua*) and beer fermenting jar (*batsa*) (Figure 3.21 and Table 3.4) we see that their forms, and consequently their Ratio 1 and 5 values, are almost identical; it is their size that separates them functionally. Without doubt, it would be impossible to brew large quantities of beer in a single *tsua*, and extremely difficult to lift a full *batsa* to the lips in order to take a drink.

This does not mean that vessels of the same form, but of different size, should always be seen as different functional classes. Although the Gamo's large jar (*otto*) is the same form as the *tsua* and the *basta*, unlike the *tsua* it is also used to brew beer (it is a multifunctional vessel and may also be used for cooking, storing and transporting) (Arnold 2006, Table 2.2; 2002). The corollary here is that, as the *otto* is not that much smaller than the *basta*, it is able to fulfil the same functional requirements; indeed, there is considerable overlap between the volumetric ranges of the *otto* and *basta* (Figure 3.21) (the range of volumes for the *tsua* is 0.9-2.4 litres, whilst that of the *otto* is 14.1-26.5 litres, and the *batsa* 23.4-102.1 litres (Arthur 2002, Table 5)). Differences in the size of pots belonging to the same functional class can also be seen in the vessels of the Manumanu. Their cooking pots (*uro*) range in size from c.10-16 inches (25-40cm) in diameter, whilst their water storage jars are c.12-20 inches (30-50cm) in diameter (see above and Groves 1960, 10).

Vessel	**Max Dia (cm)**	**Height (cm)**	**Rim Dia (cm)**	**Ratio 1**	**Ratio 5**
A	15	18	8	0.83	0.53
B	45	63	28	0.71	0.62
C	60	74	31	0.81	0.52
D	36	46	20	0.78	0.56

Figure 3.21 and Table 3.4: Gamo pottery; the *tsua* (A), is a drinking vessel, the *otto* (B) is a multipurpose vessel used in cooking, storage and as a beer storage/fermenting jar. The *batsa* (C) is a dedicated beer storage/fermenting jar, whilst the *tsaro* (D), like the *otto* is a multifunctional cooking and storage jar (Arthur 2006, 36-7, Figure 2.7).

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Vessel	Max Dia (mm)	Height (mm)	Rim Dia (mm)	Ratio 1	Ratio 5	Approximate Volume (litres)
887	290	269	120	1.08	0.41	8.4
58	250	253	100	0.99	0.40	5.3
415	215	205	88	1.05	0.41	3.8
384	284	236	194	1.20	0.68	8.4
1026	250	195	180	1.28	0.72	4.8
567	272	241	158	1.13	0.58	7.7
403	150	131	91	1.15	0.61	1.0

Figure 3.22 and Table 3.5: Ratio values and approximate volumes of urns excavated from the cemetery of Cleatham (data derived from Leahy 2007c).

Looking at the Anglo-Saxon situation, then, we can see from Figure 3.22 and Table 3.5 that both Cleatham urns 403 and 567 have very similar ratio values, but they are completely different sizes. It can be suggested, albeit tentatively, that 567 was used for communal serving of produce, with its unrestricted mouth allowing easy access to the contents, whilst 403 might have been used to as a personal or communal drinking vessel. Certainly, the size of the latter would allow it to be passed amongst individuals, and its wide mouth would facilitate filling and drinking. The crucial point here is that, despite their similar ratio values, the sizes of these two vessels mean that they are not interchangeable equivalents; concomitantly, they would belong to two separate functional classes.

By considering vessels with similar forms but slightly different sizes we can see that Cleatham urns 58, 415, 887 (Figure 3.22 and Table 3.5), like the Gamo *olla* and *basta*, might be used in the same way. Indeed, all three could hold a substantial quantity of produce (c.5.3, c.3.8, 8.4 litres, respectively – see below for a discussion of the calculation of volumes), and when full all would be of considerable weight which would inhibit their manoeuvrability, whilst their restricted orifices would limit access to the contents, prevent spillage, and facilitate pouring. Their relatively narrow bases would also assist in tipping the vessel to pour out the contents. Urns 0384 and 1026 might also be used in the same way as one another; indeed, both have unrestricted orifices, allowing easy access to their contents, both could contain considerable amounts of produce (c.4.8 litres and c.8.4 litres, respectively), would be heavy when full, again restricting manoeuvrability, whilst their squat bodies would provide a low centre of gravity preventing spillages (Figure 3.22 and Table 3.5).

A New Typology

Having determined that ratios and vessel size can be used to reveal the native classification of pottery, these characteristics were used to discover Anglo-Saxon types. Previous studies have been criticised for making arbitrary distinctions between plain and decorated pottery. For example, Blinkhorn (1997) criticised Myres for his unjustified prejudice towards the study of plain undecorated pottery. Indeed, Myres described the dichotomy between the two as ‘an almost incredible contrast between extremes of sophistication and crudity possible in ceramic technique’, suggesting that decorated vessels represent potters at their ‘self-conscious best’, whilst it is ‘difficult to believe that folk of the same culture and period were responsible for designing and making ... the shapeless and incompetent domestic [undecorated] bowls and cookpots' (Myres 1969, 12-13). More damningly he reports that 'in view of the extremely casual and slapdash methods often used by Anglo-Saxon craftsmen in the preparation of their raw materials and the shaping of their home-made products ... it is open to question whether conclusions of much significance can be expected from such technical analysis' (Myres 1977, 1). This study makes the same distinction, however as use-alteration analysis (Chapter 2) demonstrates, plain and decorated pottery had different functions and, as function is seen to be at the heart of native classificatory systems, such a distinction is necessary.

Methodology

Scale drawings of all Cleatham urns were obtained from the online Cleatham excavation archive –made available by the Archaeological Data Service (Leahy 2007c) – whilst images of Elsham urns were taken from the excavation archive held at North Lincolnshire Museum. As ratio values cannot be determined from incomplete pots only those vessels with complete profiles were considered, a total of 317 urns from Cleatham and 173 from Elsham. Using Adobe Photoshop, images were manipulated so that all were viewable at the same scale; these were then printed and sorted visually according to ratio-based characteristics. For example, regardless of size, vessels with tall bodies (low Ratio 1) and restricted mouths (low Ratio 5) were separated from those with tall bodies and wide mouths (for example, urns 887 and 567, Figure 3.22), whilst tall wide-mouthed vessels were separated from those with wide mouths and squat, wide bodies (large Ratio 1 and 5 values) (for example, urns 567 and 1026, Figure 3.22). At no point was consideration given to whether urns were shouldered, biconical, rounded, or globular; this was seen purely as micro-style variation.

To identify smaller and larger versions of the same type, as suggested by Havercroft *et al.* (1987), images of the urns were scaled and 'overlain' so that forms could be compared. Overlays were produced by 'pasting' urns on top of one another in Adobe Photoshop and then adjusting the 'opacity'; this feature alters an image's transparency, meaning that the profile of each urn could be compared with those 'above' and 'below'. As suggested by Havercroft *et al.* (1987, 52), comparison was achieved by scaling to the 'same height' and/or 'same maximum girth' (Figure 3.23). The overlay method also facilitated the identification and subsequent discounting of micro-style variation. For example, despite minor differences in position and shape of shoulder, height, width, and base, the overlay of urns 582 and 944 reveals that they are the same type of pot. A similar situation is demonstrated by urns 519 and 388, where minor variations in rim type appear on what are the same forms (Figure 3.23).

Figure 3.23: Urns 415 and 594 (top). Urn 415 is smaller than 594, but using Havercroft *et al.*'s (1987) method of overlaying and scaling to the same maximum diameter reveals that 415 is exactly the same form as 594. Their method also allows micro-style variation to be identified and discounted. Urns 388 and 519 (middle) have slightly different rims and bases; the rim of 388 is more everted than 519 and its base is also slightly narrower. The overlay of these two vessels reveals, however, that they are exactly the same form. The same is true of urns 944 and 582 (bottom) – the shoulder of 944 is slightly rounded, whilst 582 is bi-conical; 582 also has a pedestal base. Despite this, the overlay of these two urns reveals that they are in fact the same form and that these differences are purely micro-style variants (scale bar is 10cm, original images from Leahy 2007c).

As larger and smaller versions of vessel types were identified, each group was allocated an identifying code. Each of the main form groups were first given a numerical identifier: Group 1 urns were those with restricted necks and a height approximately equal to width (Ratio 1 ≈ 1.0, and low Ratio 5) and Group 2 urns were squat, wide vessels with wide mouths (large Ratio 1 and large Ratio 5). These groups were further divided according to minor ratio-based variation. For example, as urns 566 and 573 (Figure 3.24) both have restricted necks, and heights approximately equal to their widths, both were considered to belong to Group 1. Yet, 573 appears 'squatter' than 566 (resulting in a greater Ratio 1 value), thus urns similar in form to 566 were identified as belonging to 1A whilst those following 573 were coded 1B. Each of these sub-groups was then divided according to size, with size being identified by i, ii, or iii; larger urns are denoted by i and smaller vessels by ii and iii (Figure 3.24).

The morphological measurements of height, maximum diameter, rim diameter, and height of maximum diameter, and the relevant ratio values for each urn, were recorded. For Cleatham, all of this information was already available in the ADS's online Cleatham excavation archive (Leahy 2007c). The Elsham data, however, had to be obtained from measured scale drawings and the urns themselves. To help distinguish between size groups, histograms of maximum height were produced for each of the main types (Figures 3.33, 3.36, 3.38, 3.41). In order that this study did not suffer from the use of unsubstantiated cut-off values to define types, no numerical limits were identified; instead, an overall impression of the groups is provided by calculation of the mean, range and standard deviation of each measurement and ratio (Appendix B).

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Figure 3.24: Urns belonging to Groups 1A and 1B (top). Both have heights approximately equal to their widths, thus Ratio 1 ≈ 1. They are separable on account of the fact that 0573 (1B) is slightly squatter than 0536 (1A). Urns 0384, 0063, 0459, 0004 belong to Group 3B. The urns were attributed a sub-group according to their size, thus the largest (0384) is 3Bi, then 3Bii (0063), 3Bii (0459), and the smallest 3Biii (0004) (scale bar is 10cm, images from Leahy 2007c).

To help determine whether vessels of different sizes might be considered to belong to the same functional class, an estimate of the volume of each of the urns was also calculated. This was undetaken by following the method described by Blinkhorn (1999). Scale drawings of each of the 173 Elsham and 317 Cleatham urns were taken; each drawing was then divided in to 1cm thick horizontal slices (Figure 3.25). When considered in three dimensions, each slice represents a geometrical form known as a frustum. By calculating the volume of each frustum (Figure 3.25) and then summing the volumes of each together, it is possible to obtain an estimate of the vessel's volume (Blinkhorn 1999, 41-2).

The volume of a frustum is calculated thus:

$$V = \frac{\pi h}{3}(R_1^2 + R_1 R_2 + R_2^2)$$

where:

V = volume of frustum (litres)

R_1 = radius of the upper surface of the frustum (m)

R_2 = radius of the lower surface of the frustum (m)

h = height of the frustum (m)

π = 3.142

Figure 3.25: Calculating an estimated volume for individual cremation urns. Vessels are idealised as a series of 1cm high frustums (shape, top left). The volume of each frustum is calculated and then summed to obtain an estimate of the urn's volume (frustum image Mathworld 2012; urn image adapted from Leahy 2007c)

Not all pots could be placed immediately into groups. Rather than force them into categories, a system of reflexive elimination was employed. This involved the measurement and ratio values of pots being compared with those of the developed groups. If these measurements suggested membership to a particular group then this was tested by comparing it to others in the suggested group by the method of overlaying and scaling. If this did not verify group affiliation the pots were added to the 'Unclassified Group' with an accompanying 'Suggested Group' membership.

The New Typology

Following the methodology outlined above six main form groups were identified. These groups were then divided into size and morphological sub-groups, resulting in a total of 30 types. Figures 3.26-3.28, 3.34, 3.35, 3.37, 3.39 and 3.40 provide examples of each of the forms, whilst the number of urns attributed to each group are given in Table 3.6. The following description characterises the types and those interested in reviewing complete groups are referred to Appendix B.

Group 1

Group 1 urns are characterised by their restricted mouths and widths that are approximately equal to their heights (Figures 3.26-3.30). Although there is considerable variation in the position and contour of the shoulder, the same basic form runs throughout each of these vessels; that is, a voluminous body with a narrowing neck, leading to a narrow mouth (relative to the rest of the body). On account of minor ratio-based variation Group 1 is divided into three sub-groups, with each sub-group being divided into three further groups on account of their size – essentially, small medium and large.

1Ai, 1Aii and 1Aiii (Figure 3.26)

Group 1A urns are characterised by heights that are approximately equal to the maximum diameter (Ratio 1 is approximately equal to 1) and rim diameters that are approximately half of the maximum diameter (Ratio 5 is approximately 0.5) (Figures 3.26, 3.29 and 3.30). Three broad sizes – small, medium and large – were identified in this group, on account of a tri-modal distribution of heights; this equates to three average volumetric capacities of c.7 litres, c.4.5 litres and c.1 litre (Figures 3.31 and

3.33). The large and medium sizes (1Ai and 1Aii) were common at both cemeteries but were slightly more popular at Elsham; the smallest size (1Aiii) was also only identified at Elsham (Table 3.6). It is interesting to note that the average height of Cleatham's 1Ai group is slightly greater than Elsham's. The average heights of both cemeteries' 1Aii urns, on the other hand, are within 1mm of one another. As one would expect, the average ratio values of the small, medium and large 1A urns are all very similar, falling within a very narrow range – Ratio 1: 1.06-1.11 and Ratio 5: 0.43-0.53 (Figure 3.29 and Appendix B) (these should not be taken as boundaries, they are merely the range of average ratio values of the three sizes).

1Bi, 1Bii and 1Biii (Figure 3.27)

Group 1B urns have a slightly squatter appearance than the other vessels in Group 1, a point which is confirmed by their slightly larger Ratio 1 values; the range of average Ratio 5 values, however, are almost identical to those of the Group 1A – 0.49-0.53 (Figures 3.26, 3.27 and Appendix B). At Cleatham the Group 1B type was very frequent; at Elsham, however, very few 1B urns were present (Table 3.6). Again, three sizes were identifiable on account of a tri-modal distribution of height and these translate to average capacities of c.5 litres, 3.5 litres and 1.5 litres (Figures 3.27 and 3.31 and 3.33). As one would expect, with larger and smaller version of the same form, there is considerable overlap between the ratio characteristics of each of the three size groups (Figures 3.29 and 3.30 and Appendix B). Despite the small number of 1B urns at Elsham, when the mean ratio values are compared between the two cemeteries it is evident that the values of each size group are extremely similar (Figure 3.29). In addition to likenesses in ratio values, the mean volumes of all three sizes are almost identical at both cemeteries and we also find that there is a consistent c.3cm difference between the mean heights of the 1Bi and 1Bii (Figures 3.30 and 3.31 and Appendix B). This demonstrates that the potters were working towards a mental template of acceptable size and form.

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Figure 3.26: Urns attributed to Group 1A. Group 1A urns are characterised by heights that are approximately equal to their widths (Ratio 1 ≈ 1) and restricted mouths (low Ratio 5 values). Three sizes were identified; 1Ai, 1Aii and 1Aiii (Cleatham images from Leahy 2007c, Elsham images were obtained from the Elsham archive held in North Lincolnshire Museum).

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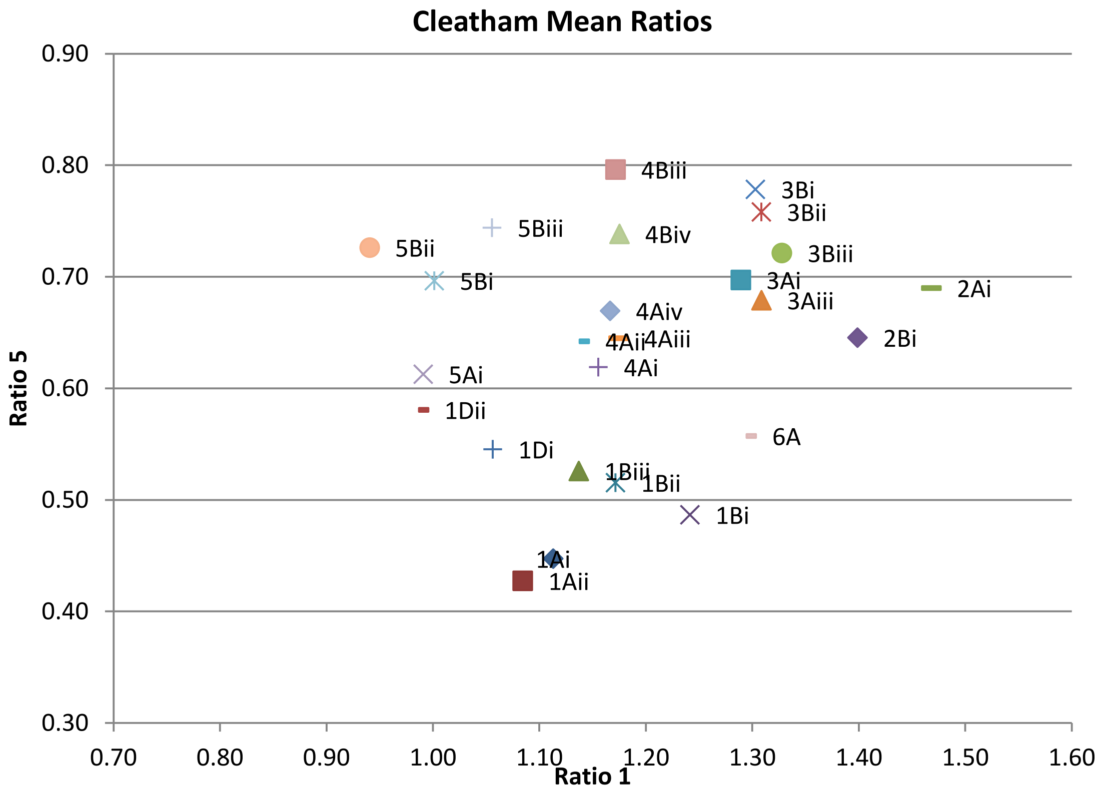
Figure 3.27: Urns attributed to Group 1B. Group 1B urns have restricted mouths and are slightly wider than they are tall. Three sizes were identified, 1Bi, 1Bii and 1Biii (Cleatham images from Leahy 2007c, Elsham images were obtained from the Elsham archive held in North Lincolnshire Museum).

Figure 3.28: Urns attributed to Group 1D. Like Groups 1A and 1B, Group 1D urns have restricted mouths. They are slightly taller than they are wide. Three sizes were identified, 1Di, 1Dii and 1Diii. (Cleatham images from Leahy 2007c, Elsham images were obtained from the Elsham archive held in North Lincolnshire Museum.)



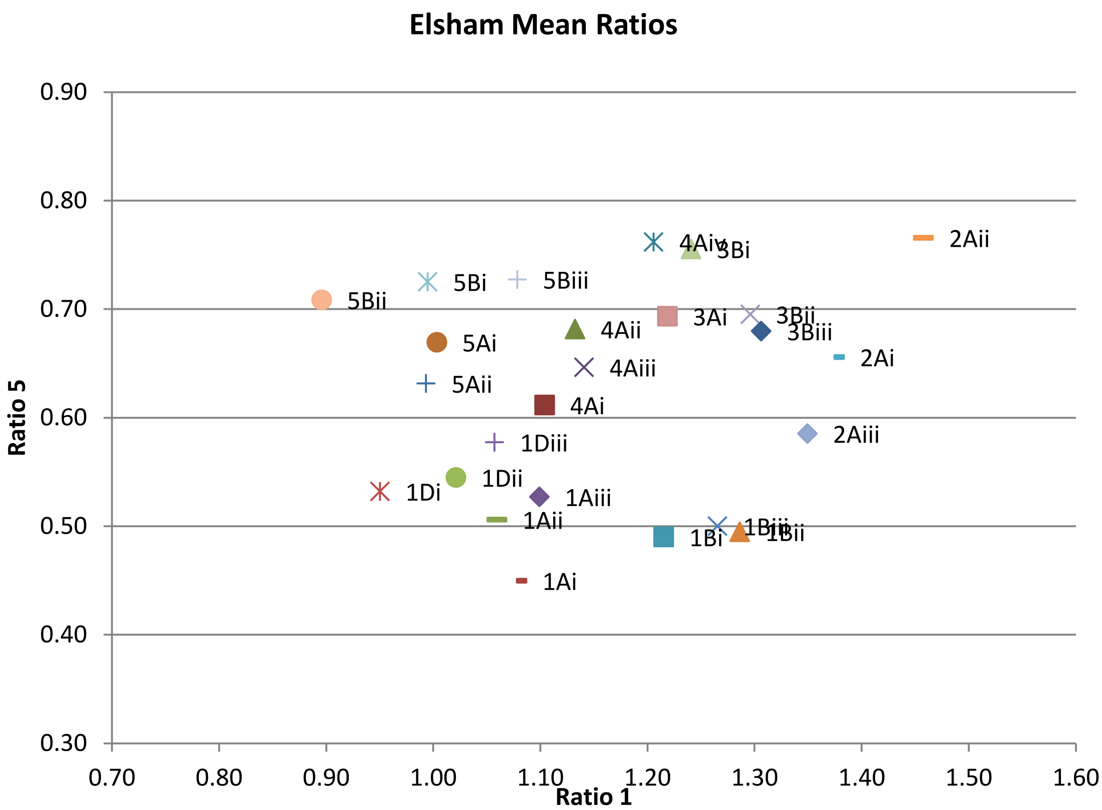
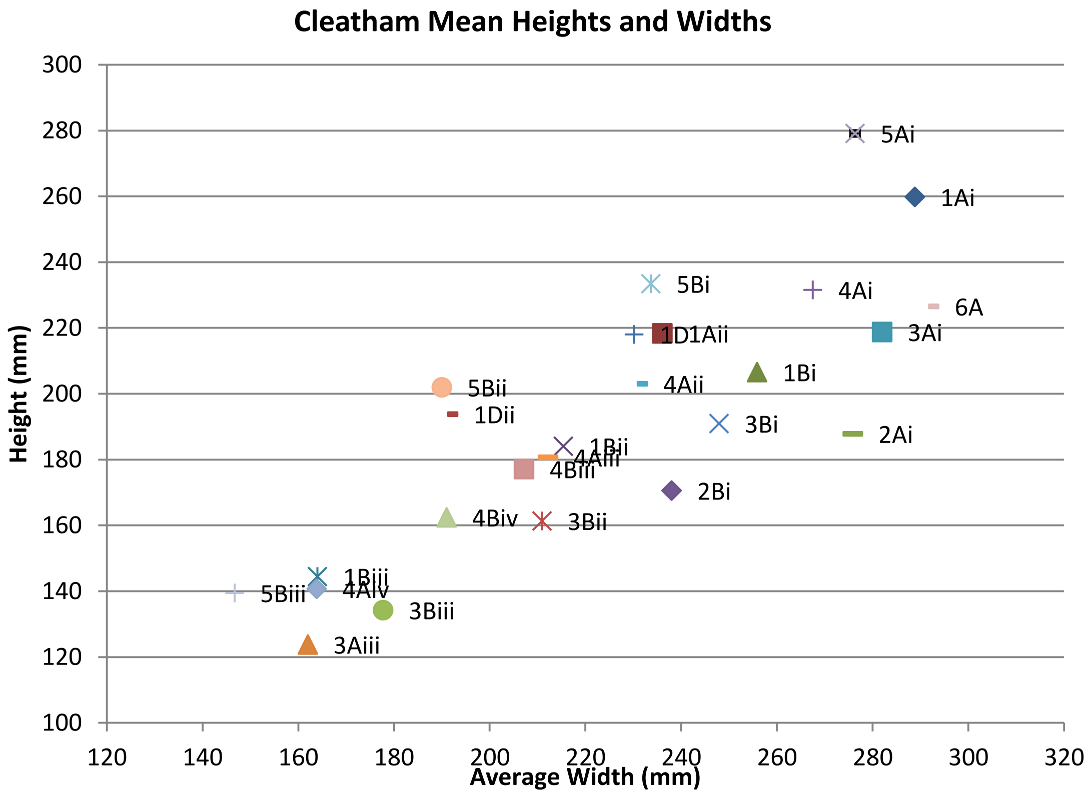


Figure 3.29: Scatter plots of the mean Ratio 1 and 5 values calculated for each of the form types identified in this study. Note that the mean ratio values of smaller and larger types (e.g 1Bi, 1Bii and 1Bii) are very similar and cluster together.



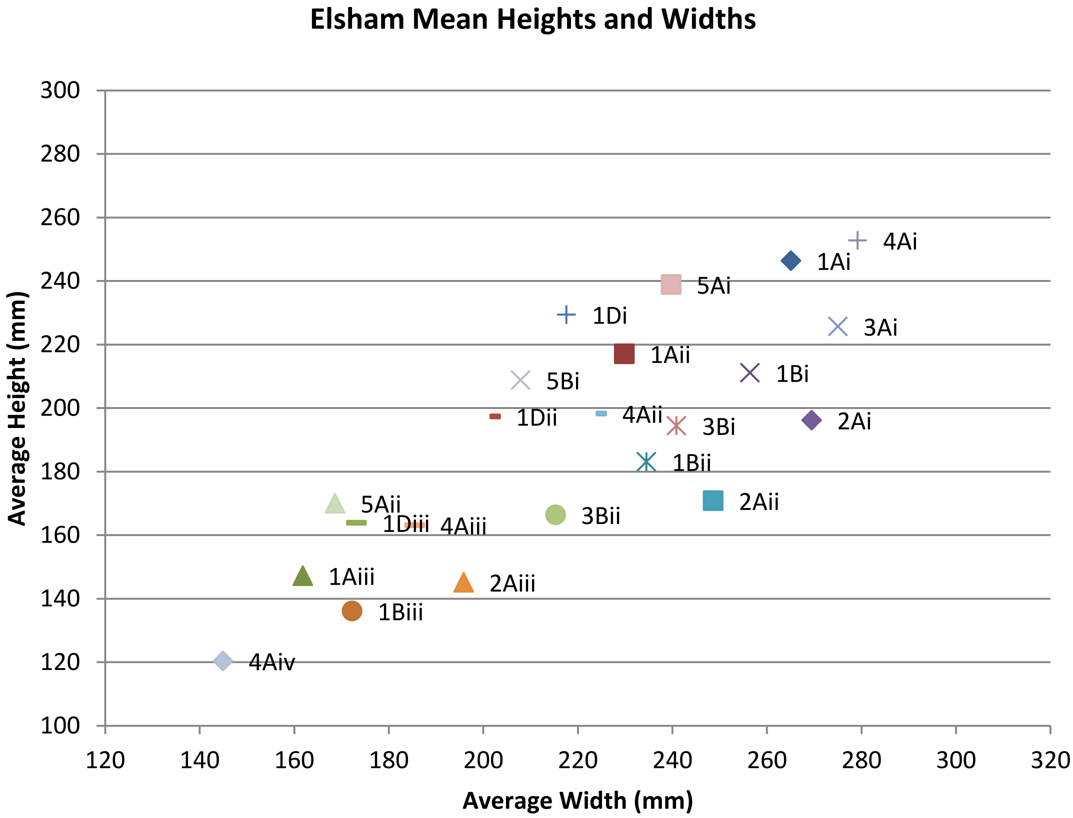


Figure 3.30: Scatter plots of the mean heights and widths of each form type identified in this study. Note that the means of each form type are very similar at both cemeteries.

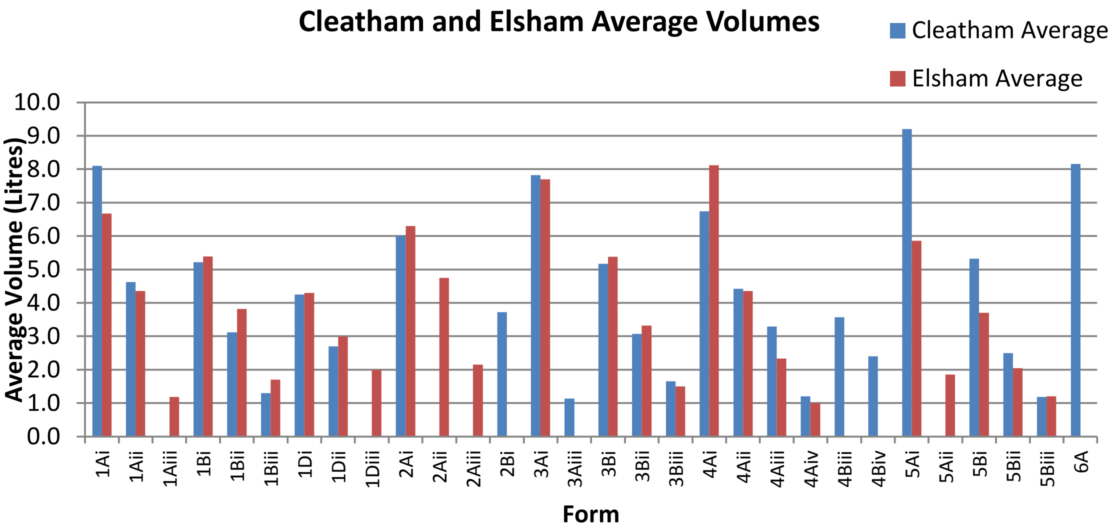


Figure 3.31: Average estimated volumes for each of the form-types identified in this study. Note that the average volumes obtained for forms at both cemeteries are virtually identical.

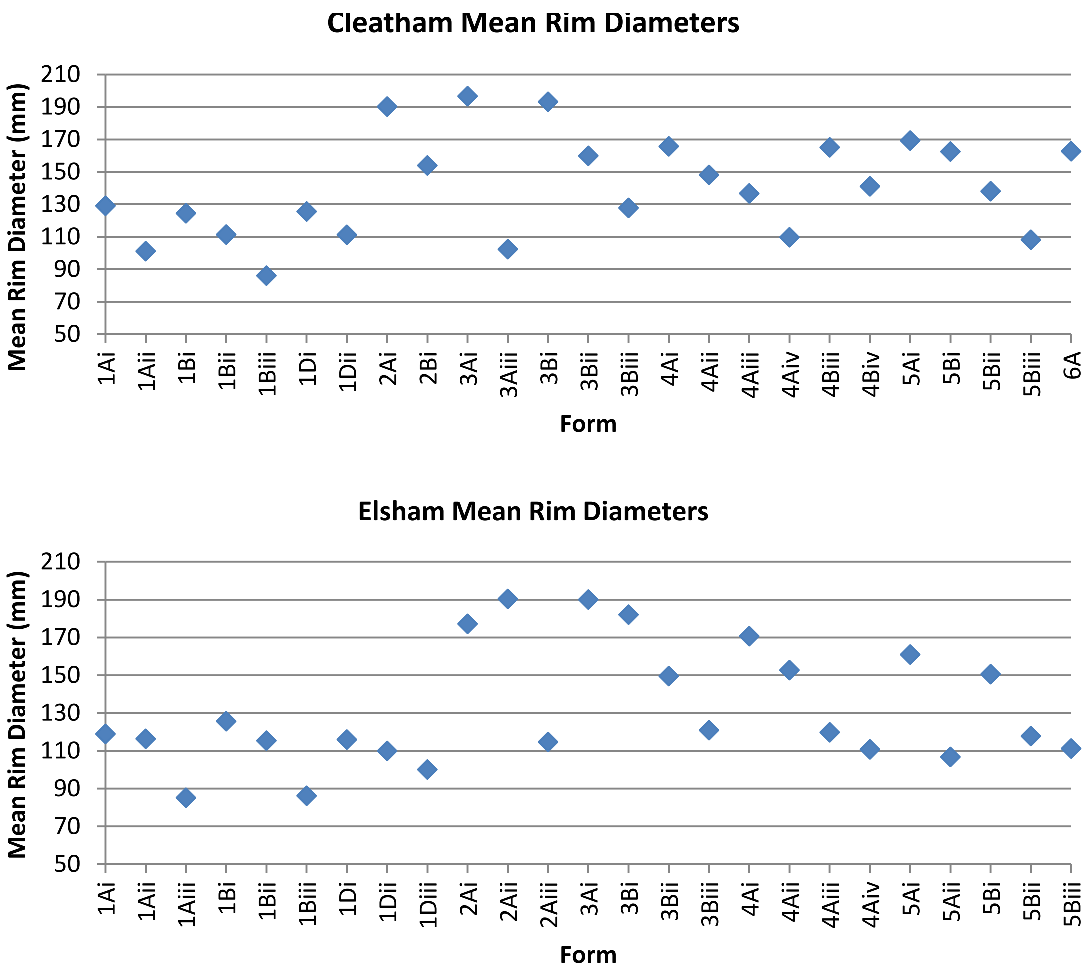


Figure 3.32: Average rim diameters of each of the types identified in this study.

Form	Cleatham	%Cleatham	Elsham	%Elsham
1Ai	24	8%	20	13%
1Aii	15	5%	17	11%
1Aiii	0	0%	4	3%
1Bi	22	8%	5	3%
1Bii	18	6%	6	4%
1Biii	4	1%	1	1%
1D	12	4%	17	11%
1Dii	7	2%	11	7%
1Diii	0	0%	3	2%
2Ai	8	3%	4	3%
2Aii	0	0%	4	3%
2Aiii	0	0%	2	1%
2Bi	19	7%	0	0%
3Ai	12	4%	4	3%
3Aiii	7	2%	0	0%
3Bi	12	4%	5	3%
3Bii	15	5%	5	3%
3Biii	7	2%	1	1%
4Ai	8	3%	5	3%
4Aii	24	8%	8	5%
4Aiii	11	4%	11	7%
4Aiv	13	5%	3	2%
4Biii	6	2%	0	0%
4Biv	2	1%	0	0%
5Ai	6	2%	5	3%
5Aii	0	0%	5	3%
5Bi	12	4%	3	2%
5Bii	1	0%	4	3%
5Biii	10	4%	1	1%
6A	10	4%	0	0%
	285	100%	154	100%

Table 3.6: The frequencies of occurrence of each form type at the cemeteries of Elsham and Cleatham. Note that these frequencies only relate to decorated vessels with reconstructible profiles.

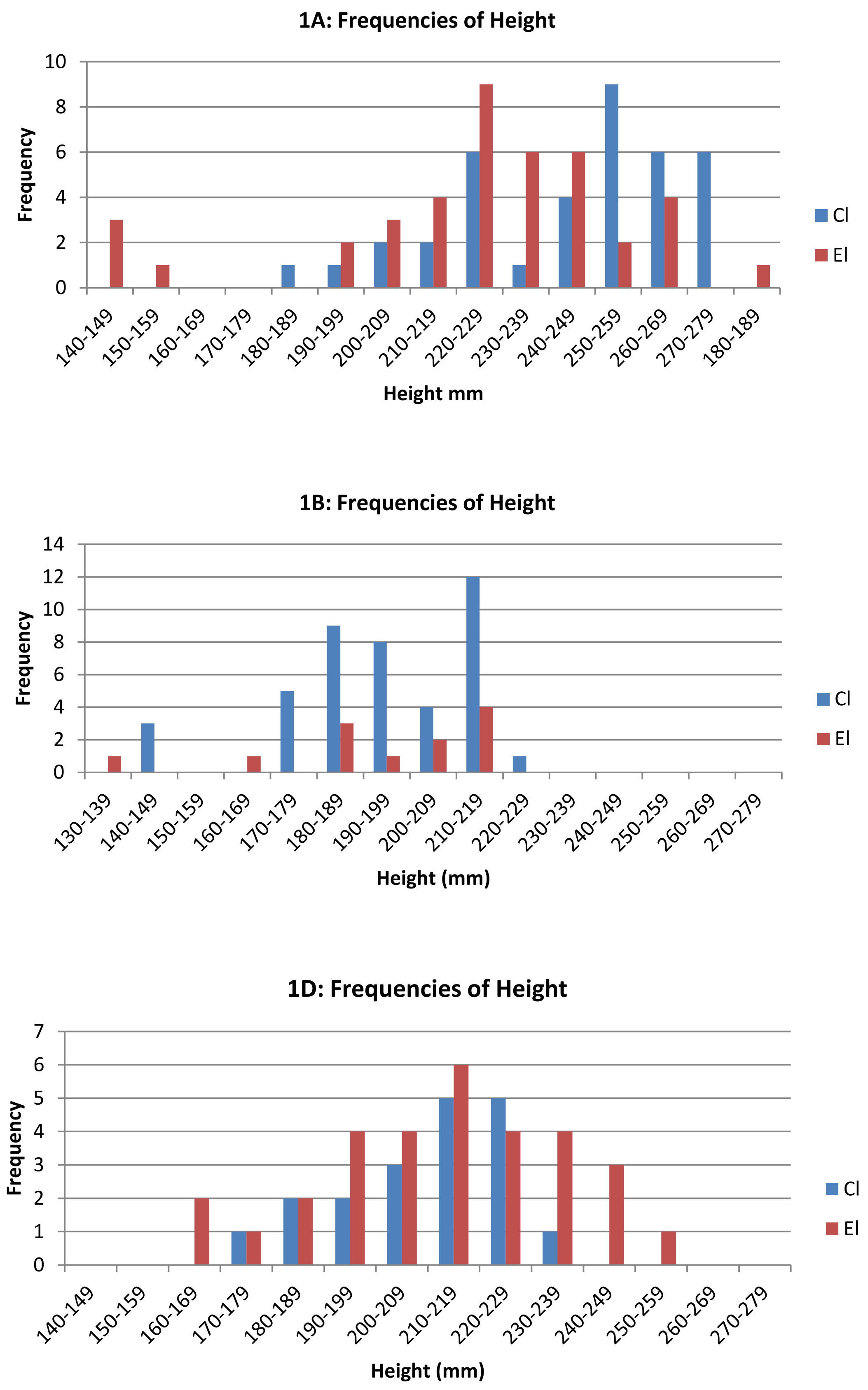


Figure 3.33: Frequency plots of the heights of urns attributed to Form Groups 1A, 1B and 1D. Note that the peaks occur at the same places in the assemblages obtained from both Elsham and Cleatham, demonstrating that potters at both cemeteries were working towards mental templates of vessel size.

1D (Figure 3.28)

Group 1D urns have approximately the same Ratio 1 values as those in 1A; they are separable, however, on account of their slightly less restricted mouths (a marginally greater Ratio 5 value – although the man rim diameters are the same as 1B and 1A urns) (Figures 3.28 and 3.29, 3.32). Group 1D urns do not follow a bi- or even tri-modal distribution of height; instead, at both cemeteries, urns attributed to 1D are normally distributed with modal heights ranging from 210-229mm (Figure 3.33). Interestingly, where Elsham had few 1B urns and Cleatham had many, the reverse situation is seen with this 1D group – Cleatham has few, but at Elsham this type is very common (Table 3.6). As the modal heights and average volumes at each cemetery are the same, we are once more we are given the impression that the potters were working within a framework of mental templates.

Group 2 (Figure 3.34)

Urns in Group 2 are characterised by their squat, wide bodies (large Ratio 1), and unrestricted necks (large Ratio 5) (Figures 3.29 and 3.34). Based on size and ratio values this group separates into two sub-groups, although there is considerable overlap between the two. Urns belonging to 2A appear wider than those of 2B, having marginally greater Ratio 1 values (Figures 3.29 and 3.34). Like the Group 1 urns, these vessels divide into small medium and large. Interestingly, 2Ai urns do not form a significant proportion of the assemblages of either cemetery, whilst 2Bi forms account for 7% of the assemblage at Cleatham, but are absent from Elsham (Table 3.6) (it must be borne in mind that here, assemblage refers to only those urns with complete profiles; it is quite possible that these figures would change if every single urn was able to be considered). We are once more given the impression that potters were working towards acceptable norms as the mean volumes of 2Ai urns are nearly identical at both cemeteries (Figure 3.31). There are very strong links between Group 2 urns and those belonging to Group 3 and it is quite possible that the slightly squatter character of Group 2 is just micro-style variation, and that Groups 2 and 3 are essentially the same types of pots. This link between the Group 2 and 3 vessels is demonstrated, in particular, by the mean rim diameters of 2Ai and 3Ai – at Elsham they are within 13mm of one another, but at Cleatham just 6mm – whilst at both cemeteries, the mean width of 2Ai is very similar to those of the 3Ai, as are the mean heights of 2Ai and 3Bi (Figures 3.30 and 3.32 and Appendix B).

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Figure 3.34: Urns attributed to Groups 2A and 2B. Urns in these groups appear are very squat (large Ratio 1 values) and have unrestricted mouths (large Ratio 5 values). 2B urns appear slightly less restricted in the mouth, having slightly greater Ratio 5 values than their 2A counterparts (Cleatham images from Leahy 2007c, Elsham images were obtained from the Elsham archive held in North Lincolnshire Museum).

Group 3

Like urns in Group 2, urns belonging to Group 3 are characterised by open mouths and squat, wide bodies (Figures 3.24 and 3.35). What distinguishes them from Group 2 is that they appear less squat, having slightly smaller Ratio 1 values. Urns in Group 3 can be sub-divided into small, medium large, and perhaps even extra-large.

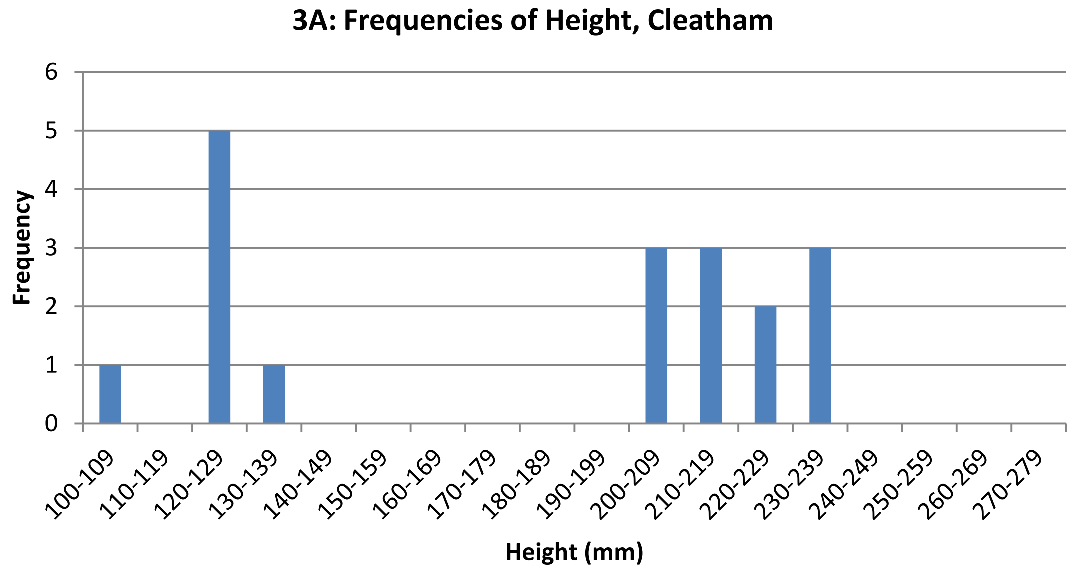
3Ai and 3Aiii (Figure 3.35)

Group 3Ai urns are the largest of the Group 3 urns. In terms of their Ratio 1 values they are virtually indistinguishable from urns belonging to 3B, yet they are separable on account of their slightly lower Ratio 5 value – meaning that 3Ai urns appear slightly more restricted in the neck than the 3Bi urns (Figures 3.24, 3.29 and 3.35). Despite this, 3Ai and 3Bi urns have almost identical average rim diameters (Figure 3.32). Again these vessels appear to have been produced to relatively standard sizes as the average height, widths, volumes and Ratio 1 and 5 values of the 3Ai urns are virtually identical at both cemeteries (Figures 3.29-3.30 and Appendix B).

3Bi, 3Bii and 3Biii (Figure 3.24)

Group 3B is divided into three sized-based groups – separated on account of a tri-modal distribution of heights – but again the Ratio 1 and 5 values of each of the different sizes are all very similar (Figure 3.36). At Cleatham the tri-modal distribution was clearly visible in a plot of the heights, but at Elsham, even though the same types were present, there were too few vessels to identify any patterns in a graphical plot. At both Cleatham and Elsham there is a c.3cm separation between the mean heights of 3Bi, 3Bii and 3Biii, which equates to three average capacities of c.5 litres, c.3 litres and c.1.5 litres (Figure 3.31 and Appendix B).

Figure 3.35: Urns attributed to Group 3A from Elsham (left) and Cleatham (right) (Cleatham images from Leahy 2007c, Elsham images were obtained from the Elsham archive held in North Lincolnshire Museum).



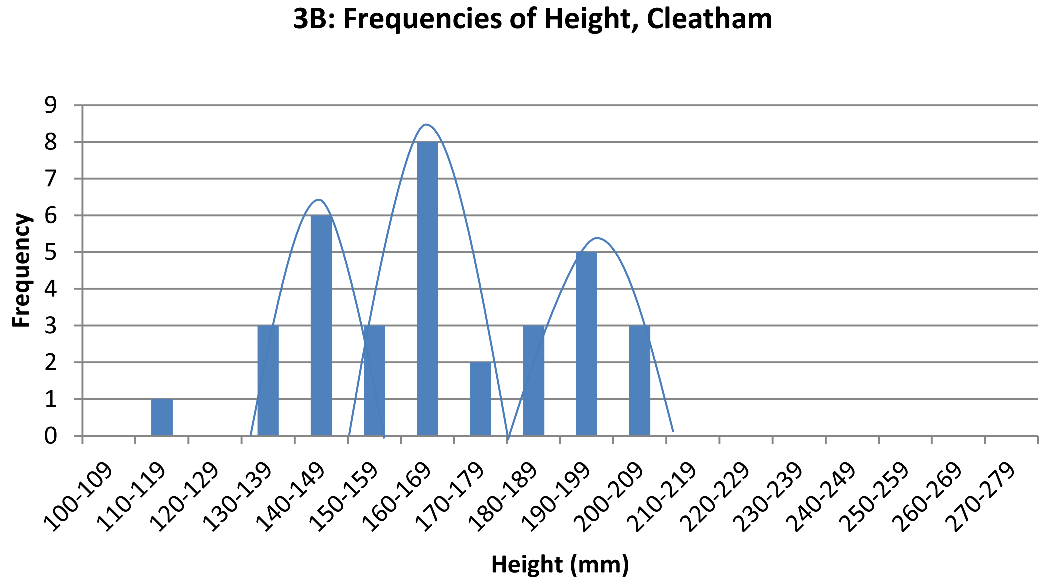


Figure 3.36: Frequency plots of the heights of urns attributed to Form Groups 3A and 3B from Cleatham. Note that the two sizes of 3A urns – 3Ai (200-239mm) and 3Aiii (100-139mm) – and the three peaks in the 3B plot representing the three different sizes of this form-type.

Group 4

In common with urns belonging to Group 1A, urns in Group 4 have heights approximately equal to their widths. What separates them from Group 1A, however, is that they have considerably less restricted mouths. Group 4 is separable into two types, 4A and 4B, and again these can be divided on account of their heights and volumes.

4Ai, 4Aii, 4Aiii and 4Aiv (Figure 3.37)

Each of the four size-groups have very similar Ratio 1 and 5 values, all of which are seen to cluster in the centre of the plot of mean ratios (Figures 3.29 and 3.38). All have a slight neck restriction, and the mean and modal heights of each of Cleatham's 4A urns increase in increments of c.3cm from smallest (4Aiv) through to largest (4Ai) (Figure 3.30 and 3.38). Many 4A urns were identified at Cleatham, but at Elsham this type was not as common (Table 3.6). As such, the mean heights, widths and ratio values are based on very few urns. Despite this, similar patterns are observable; for example, there is a c.3cm incremental decrease in mean height of each of the size types from 4Aii to 4Aiii and 4iv at both cemeteries (Figure 3.38 and Appendix B). Furthermore, the average volumes of the 4Aii urns at both cemeteries were 4.42 litres and 4.35 litres respectively, whilst those of 4Aiv were 1.0 and 1.2 litres, respectively (Figure 3.31).

4B (Figure 3.39)

Only eight urns were attributable to Group 4B; all derive from Cleatham. The mean Ratio 1 value is almost identical to that of 4Ai and they are, on average, the same size as the 4Aiii vessels. They are separable, however, on account of their wider mouths; indeed, their Ratio 5 values are more akin to those of 3Bii and 3Biii, whilst the average rim diameter is equal to that of the wide mouthed 3Bii (Figures 3.29 and 3.32 and Appendix B). The absence of this type from Elsham is in keeping with Elsham's general lack of Group 4 urns.

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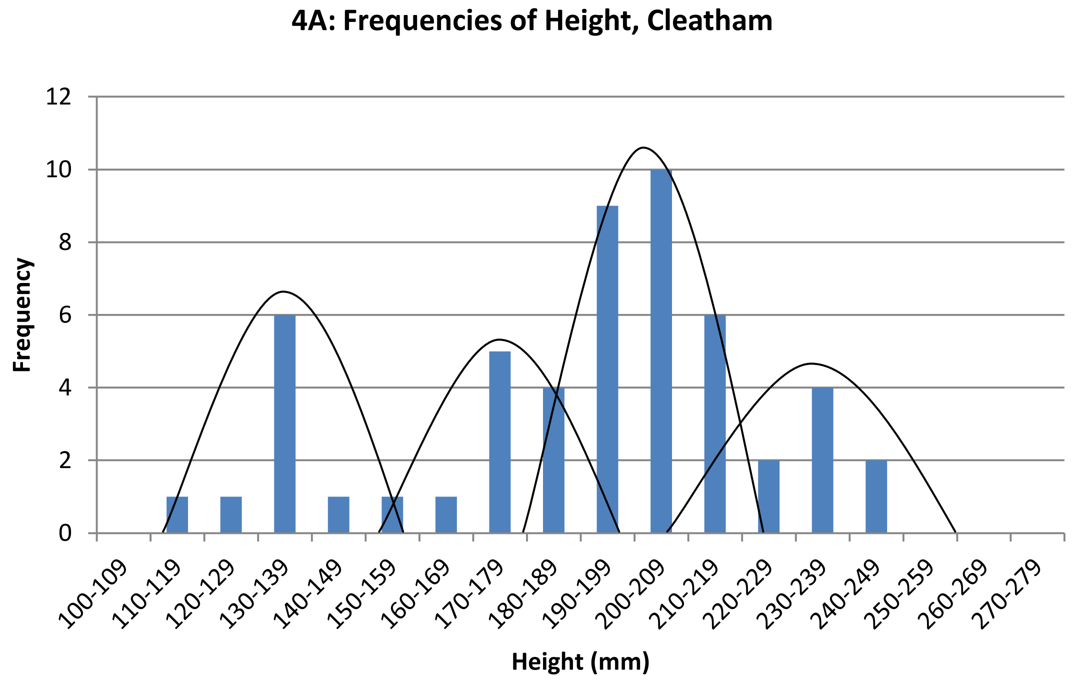
Figure 3.37: Urns attributed to Group 4A. Group 4A urns have heights approximately equal to their widths (Ratio 1 ≈ 1) and slightly restricted mouths. Four sizes were identified in this study; 4A, 4Aii, 4Aiii and 4Aiv (Cleatham images from Leahy 2007c, Elsham images were obtained from the Elsham archive held in North Lincolnshire Museum).



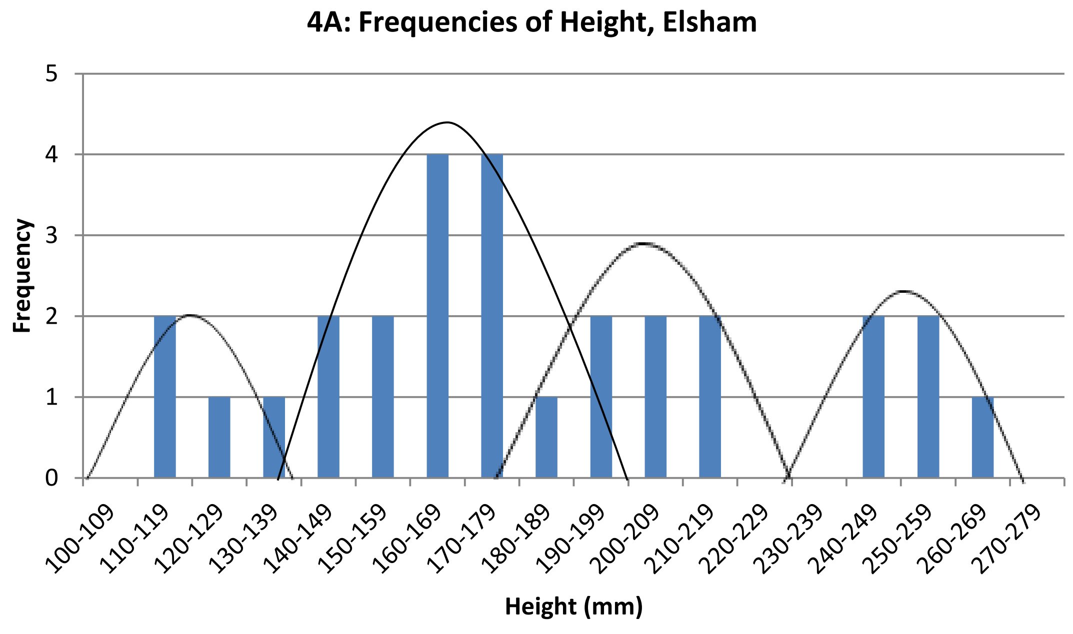


Figure 3.38: Frequency plots of the heights of urns attributed to Group 4A from Cleatham and Elsham. Note the four peaks in the frequency plots from the assemblages at both cemeteries, representing the four sizes in this group – 4A, 4Aii, 4Aiii and 4Aiv. Whilst the frequency with which each type occurs is slightly different at both cemeteries, the fact remains that the peaks occur at similar points along the height axis. This demonstrates that potters were working towards clear metal template of acceptable sizes of vessel form.

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Figure 3.39: Urns attributed to Group 4Biii and 4Biv (images from Leahy 2007c).

Group 5

Urns belonging to Group 5 are distinguishable by their wide, tall bodies and relatively unrestricted necks. The major feature of these vessels is their height to width ratio; indeed they have the appearance of being the tallest form in the typology. Again we see two sub-groups, 5A and 5B; these are separable on account of their apparent neck restrictions (Ratio 5 values)

5Ai and 5Aii (Figure 3.40)

Group 5A urns have what appear to be the most restricted necks of the Group 5 urns. However, when their rim diameters are compared with those of those in 5B we see that there is very little difference between the two; indeed, at both cemeteries, the mean rim diameters of both 5Ai and 5Bi lie between 150-170mm (Figure 3.32). At Elsham Group 5A urns can be divided into two sizes, but at Cleatham only the largest size was present (Figure 3.41 and Table 3.6). There is much variation in the volumes of these groups between the two cemeteries. At Cleatham, 5Ai urns have the largest average volumes of all the forms, whilst at Elsham the mean volume of this form is considerably smaller (Figure 3.31).

5Bi, 5Bii, 5Biii (Figure 3.40)

Group 5B urns have similar Ratio 1 values to their 5A counterparts. They are separable, however, on account of their larger Ratio 5 values (i.e. they have less restricted to necks) (Figure 3.29 and 3.40). Like the other form groups, we see small, medium and large sizes within this group, and once more there are similar volumes for these types at both cemeteries (Figures 3.31, 3.40, and 3.41).

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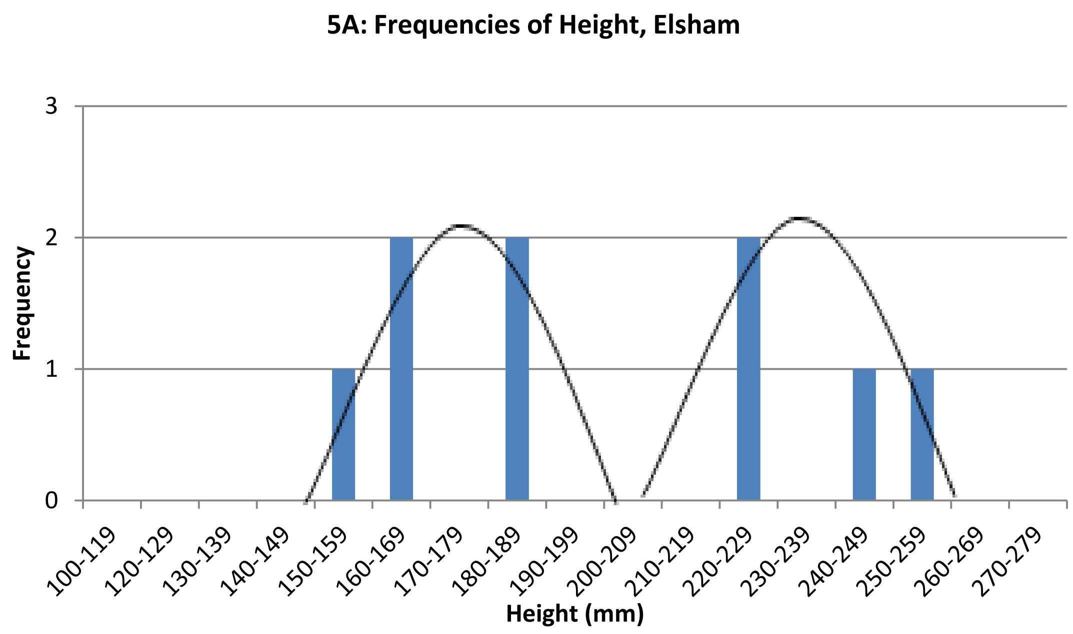
Figure 3.40: Urns attributed to groups 5A and 5B. Note that 5B urns have wider mouths than their 5A counterparts (Cleatham images from Leahy 2007c, Elsham images were obtained from the Elsham archive held in North Lincolnshire Museum).



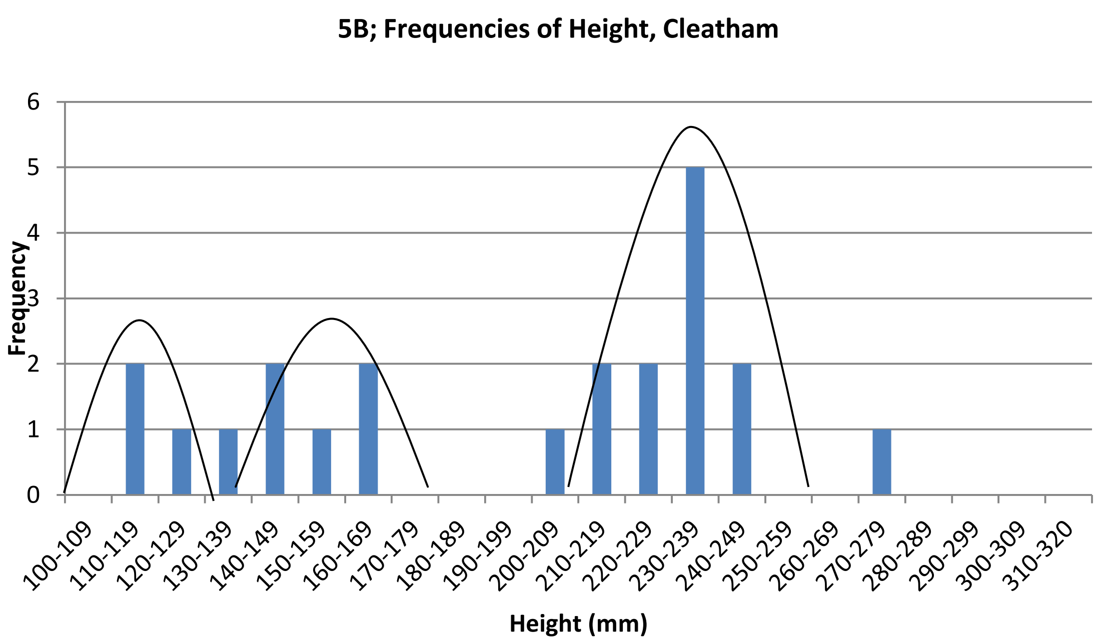


Figure 3.41: Frequency plots of the heights of urns attributed to Groups 5A and 5B from Cleatham and Elsham. Note the peaks representing the different sizes of each type.

Group 6A (Figure 3.42)

Very few urns were identified as belonging to Group 6 and all derive from Cleatham. These vessels are characterised by their large, squat bodies with slightly restricted necks. Indeed, in terms of their Ratio 1 and 5 values, they lay somewhere between Groups 1 and 2 (Figure 3.29). No size-based divisions were observable, indeed the range of heights is rather narrow, with just 6cm between the maximum and minimum vessel heights. However, the capacity ranges from 6.1-11.0 litres, with a mean of 8.2 litres (Figure 3.31 and Appendix B).

Figure 3.42: Cleatham urns attributed to Group 6A.

'*Miniatures' Group*

Approaching the form of early Anglo-Saxon pottery in the way described above reveals that potters seem to have produced miniature versions of all the major types – 1Aiii, 1Biii, 1Diii, 2Aiii, 3Biii, 4Aiii, 4Aiv, 5Aii, 5Biii, for example – and it is notable that each of these 'miniatures' have very similar rim diameters (c.120mm), heights, widths and volumes (c.1.5litres) (Figures 3.24, 3.30, 3.31, 3.43). Indeed, in a plot of mean height and width of each of the forms identified above, the 'miniatures' bunch together, forming a cluster separate from the main plot (Figure 3.30). Thus, whilst these 'miniatures' are not a separate group in their own right, it is worth highlighting the similarities between these small pots at this point in the discussion before we move to consider how various vessels in the typology might have been used in the production and consumption of fermented produce.

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Figure 3.43: Urns belonging to the 'miniatures group'. Whilst these urns do belong to other groups (e.g. Cleatham urn 1094 belongs to 4Aiv) these urns are united by their small sizes and volumes – see Figures 3.30 and 3.31.

Ungrouped Vessels

A total of 32 Cleatham and nineteen Elsham urns were classified as ungrouped. This should not be taken to mean that they were so different from the other urns that they could not be grouped. It is simply the fact that they are 'on the edge' of the above identified groups and that they cannot be confidently assigned to a particular form type. For example, the ungrouped EL76NW (Figure 3.44) has ratio values that would place it in Group 4, and probably as a 4Aiv urn, yet its rim diameter makes it appear slightly too narrow to be placed in this group. Despite this, it is clear that this vessel is part of the 'miniatures group' – the small, almost individual, cup-type vessels. The same is true of EL75AQ; its height-to-width ratio (Ratio 1) places it firmly within the family of urns attributed to Groups 2 and 3. It also has a wide mouth, which is characteristic of urns in these groups. It is simply the case that its mouth is so unrestricted – its rim diameter is slightly less than its maximum diameter – that one cannot justify placing it into either Group 2 or 3. In common with the EL76NW urn, however, we can see that it clearly belongs to the miniatures group.

Not all urns in the ungrouped category are of this small type. For example, Cleatham urn 697 looks almost like a bottle in form, it has a similar rim diameter to vessels in Group 1 (100mm), similar volume to urns in Groups 1Aii and 1Di (4.3 litres), and its height of 270mm places it alongside vessels in Group 1Ai. Clearly it has great affinity with the Group 1 urns; yet it is slightly too narrow to be justifiably placed in any of the Group 1 sub-groups. The overriding characteristic of ungrouped urns, then, is that one can see the groups to which they should belong, however they do not quite fit properly with the rest of the vessels in that group. For this reason, each of the ungrouped urns have been attributed a 'suggested group' (Appendix B).

Figure 3.44: Ungrouped urns. These vessels show affinity with specific groups but cannot be confidently placed into those groups. Elsham urn 5QQa, for example, is very similar those belonging to Group 5B, having a tall appearance and unrestricted neck. However, the mouth of the vessel is considerably wider than others in Group 5B.

Summary

As previously stated, Myres suggested that early Anglo-Saxon potters were ‘unlikely to maintain a typological exactitude of form’, that ‘any shape ... might emerge from their unskilled efforts’ and that it would be foolish to expect them to produce ‘clear-cut ... well-defined ceramic types’ (Myres 1969, 22-5). The evidence discussed above demonstrates that such a claim can no longer be justified (indeed, it is complete nonsense). In fact there is a remarkable level of consistency in form, both within the groups, between the groups, and, in particular, the range of types present in the assemblages at each of the cemeteries. The Ratio 1 and 5 values of the largest and smallest versions of individual types such as 1A, 1B, 3B, 4A and 5A, for example, are virtually indistinguishable, clearly demonstrating that the potters had a definite perception of the relationship between height and width, and rim diameter and maximum diameter, and how this translated into vessels of varying size. To this we can add the numerous bi/tri-modal distributions, the consistent c.3cm differences between the mean heights of the larger and smaller versions of the same types, the similarity in the mean heights, widths, rim diameters and calculated approximate volumes of each of the types at both cemeteries. Cumulatively, this demonstrates that the potters had a clear understanding of the range of acceptable vessel types, and their sizes, and suggests that they were producing vessels according to mental templates. This observation wholly agrees with Russel’s (1984, 577-8) findings that whilst there was variation in the range of forms of pottery produced by East Anglian early Anglo-Saxon potters, they were producing vessels according to mental templates, meeting perfectly Rice’s (1981) second criteria of household production (see Chapter 1).

Although this typology is based upon material from Cleatham and Elsham, it is applicable beyond the limits of North Lincolnshire. For example, it is possible to place all the urns in Figures 3.1, 3.2, 3.3, 3.5, and 3.12 into the typology and as Table 3.7 reveals these vessels are drawn from a wide geographical area. This agrees with Richards’s (1987, 93-9) earlier observation that there is a remarkable level of consistency in the dimensions and ratio values of urns recovered from cemeteries across the country. Together with Richards’s observation, the fact that we can place vessels from other cemeteries into the typology further promotes the idea that potters were producing vessels according to culturally acceptable standards.

Form Group	Figure	Urn Number	Cemetery
4Ai	3.1	1402	Loveden hill (Lincs)
4Aii	3.1	3258	Loveden hill (Lincs)
1Di	3.2	2319	Heyworth (Yorks)
1Di	3.2	3402	Sancton (Yorks)
3Ai	3.3	26	Loveden Hill (Lincs)
1Bii	3.3	A9/249	Loveden Hill (Lincs)
5Bi	3.5	138.3	Mucking (Essex)
1Di	3.5	139.2	Mucking (Essex)
2Ai	3.2	632	South Elkington (Lincs)
2Ai	3.12	1572	Caistor-by-Norwich (Norfolk)
1Di	3.19	1636	Caistor-by-Norwich (Norfolk)
1Di	3.19	1885	Caistor-by-Norwich (Norfolk)

Table 3.7: The typology of form developed in this chapter is applicable to pottery obtained from cemeteries across England.

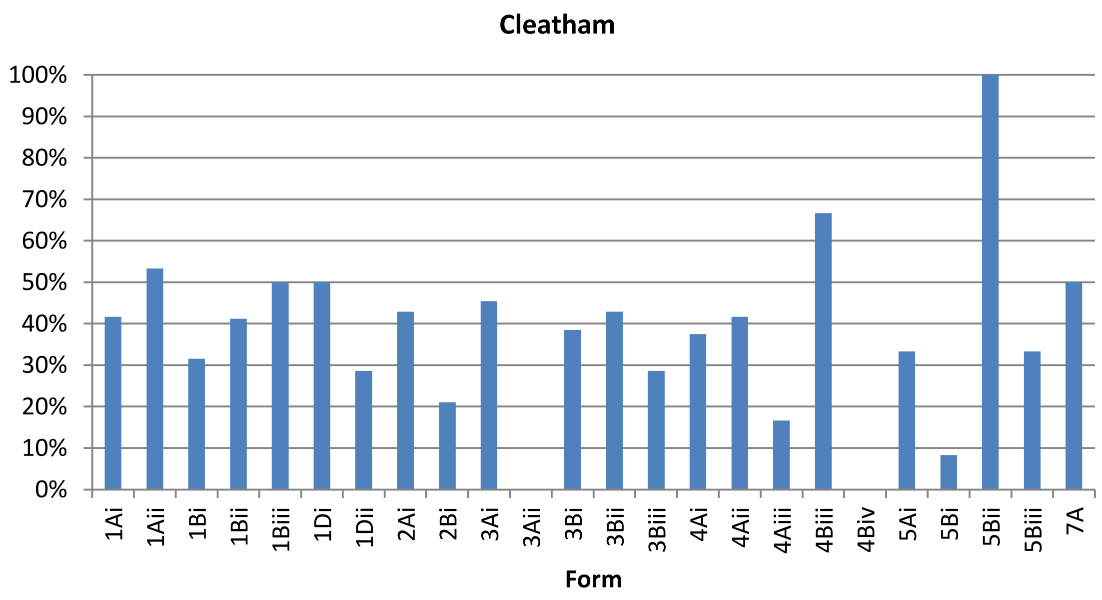
Despite the fact that most of the types are represented at both Cleatham and Elsham, and that vessels from other cemeteries fit in to the typology, there are some disparities which merit discussion. For example, Group 6A and 2Ai urns were present at Cleatham but were not found at Elsham (Table 3.6). Similarly, Group 1D urns are common at Elsham but not at Cleatham, whilst Group 1B urns are common at Cleatham but not at Elsham (Table 3.6). This might simply be a result of levels of preservation or sample size, but it does raise several questions. Were different communities of potters producing different forms? And are some of these forms just micro-style variants as opposed to being different functional classes? For example, consider the differential frequencies of the 1Bi and 1Di at Cleatham and Elsham (Table 3.6). As the mean volume of 1Bi urns at both cemeteries is c.5.2 litres, and that of 1Di is c.4.3 litres, and their mean rim diameters and heights are also very similar, we might suggest that both types performed the same functions (Figures 3.30, 3.31 and 3.32). The Cleatham community were used to making 1Bi urns to carry out a specific task, whilst the Elsham potters were more accustomed to the 1Di version. The idea of 'functional equivalents' will be discussed further later in the chapter. Having identified the range of forms, and established that these pots were used in the production and consumption of fermented produce, we must now consider how each form may have functioned in the domestic sphere.

The Form and the Function

One of the most basic relationships that can be elucidated in ceramic studies is the link between form and function (Rice 2005, 207-11, 224-5). Each task in which a pot is employed places specific demands on it, and each category of use requires a different combination of attributes and properties of form, such as: the amount of produce to be held; whether the contents will be solid, liquid, hot or cold; the stability of the vessel; how often the contents will be accessed and moved in and out; the duration of each use episode; whether the pot will be tended whilst in use; or, whether utensils will enter it. Although the use-alteration evidence demonstrates that cremation urns were employed in fermentation processes before their burial, given the range of forms, it is safe to assume that not all vessels functioned in the same manner. We must therefore attempt to discover how they were used and the roles that they may have played in the production and consumption of this produce. One way that this may be done is by drawing ethnographic analogies with specific morphological characteristics and combining this with use-alteration data.

Use-Alteration

The first point to note is that, as almost all types suffer from internal pitting (Figure 3.45), each form was involved in the production and consumption of fermented produce (note that whilst no 1Bi urns were internally pitted at Elsham, 31% of Cleatham's 1Bi urns were internally pitted). This is not an unexpected finding, indeed, in his study of use-alteration characteristics on Gamo pottery (see Chapter 2), Arnold (2002, Table. 1; 2003) found that all vessels involved in the production and consumption of produce fermented by lactic acid suffered from internal pitting, even the drinking vessels. It was anticipated that a plot of the frequency of use-alteration occurring on each of the types identified in the present study might shed some light on whether some forms suffered from attrition more than others (Figure 3.45). As Figure 3.45 demonstrates, however, no patterns emerged. Once more, this observation is in keeping with Arnold's (2002, 348) findings that the levels of attrition cannot be considered as marker of the frequency of use, or the duration of use. Thus, we cannot identify whether one particular form held fermented produce for longer than any other – for example, a short-term container, such as a drinking vessel, compared to a longer-term fermenting vessel. Our best chance of understanding how these vessels might have been used, then, is by considering their forms.



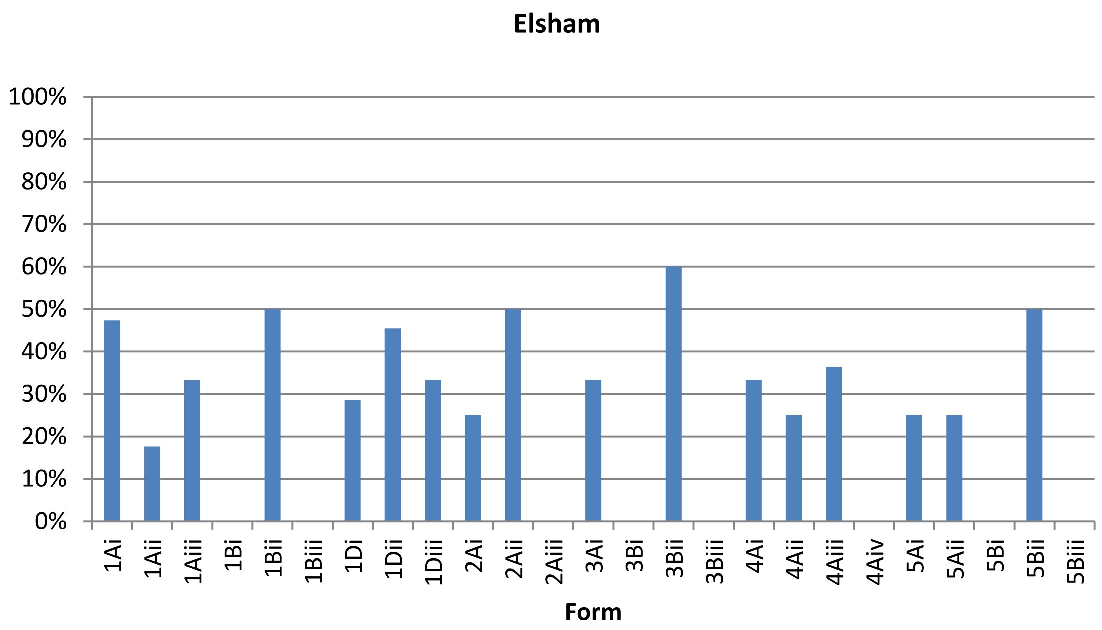


Figure 3.45: Histograms showing the frequency of internal pitting on the various form-types identified from the 285 classified Cleatham urns and the 154 Elsham urns.

Form

An extensive survey of the relationship between form and function has been undertaken by Henrickson and McDonald (1983). They considered pottery produced and used by 24 societies 'with widely diverse economic and sociopolitical systems, ranging from isolated hunter/gatherer/horticulturists to peasant towns', recording properties of vessels and their primary functions (Henrickson and McDonald 1983, 631). The following is a brief overview of their findings and it forms a basis for interpretation of each of the types identified in the new typology of Anglo-Saxon vessel form.

One of the most important characteristics of form is the relationship between the diameter of the opening and the maximum diameter (Ratio 5, see above). As Rice (2005, 212, 241) observes, an unrestricted orifice provides easy access and aids the use of the hands or utensils when stirring or extracting the contents. Henrickson and McDonald (1983, 632-3) confirm this observation, revealing that pots used in the storage of dry goods tend to have wide openings that allow easy access and the scooping-out of contents. Open-mouthed pots are not restricted to the storage of dry goods; when used as containers for liquids, unrestricted mouths facilitate filling and extraction by 'dipping' or ladling. If a vessel has a restricted opening, on the other hand, then it may be more difficult to get the contents in or out. This does have its advantages, however, as narrow mouthed vessels are often found to contain liquids as they facilitate pouring, prevent spillage during serving and processing, and inhibit evaporation. Narrow mouths also allow easy closure of the pot with a wooden or ceramic lid, or a tied-down piece of leather or textile, for example – interestingly, lids are more commonly associated with the storage of liquid. Smaller orifices might also indicate that access is infrequent or that the contents will be stored for longer periods of time (Henrickson and McDonald 1983, 632-3; Rice 2005, 212, 25-6, 241).

The height, width and volume of pottery vessels are also significant functional concerns for the producers and users of pottery. Indeed, access to the contents of a vessel may be restricted if a vessel is deep; in contrast, access is almost immediate with a shallow, wide-mouthed pot (Rice 2005, 225-6). In addition to the ease of access, shallow, wide-mouthed pots have low centres of gravity and this provides them with stability when full. Vessels used in longer-term storage are often taller than they are wide, whilst the opposite characteristics are common in vessels used for short-term storage. It is typically noted that the size of longer-term storage (weeks or months) vessels may render them immobile when full, whilst shorter-term storage pots are generally smaller and easier to manoeuvre. The number of people whom a vessel may serve also has bearing on its size. Indeed, personal serving and consumption pots are often considerably smaller than their communal counterparts. Indeed, it has been noted that 'family-sized' bowls are roughly three times the volume of 'individual-sized' bowls (Henrickson and McDonald 1983, 632-3).

The Functional Properties of Anglo-Saxon Types

Consideration of the groups identified in the typology in light of these functional and use-alteration characteristics suggests a relatively narrow range of functions and that some types may have been functional equivalents. For example, groups 1Ai, 1Aii, 1Bi, 1Bii, 1Di all have very similar Ratio 1 values and similar levels of neck restriction, a point confirmed by the similarity in their mean rim diameters. In addition, the mean volumes of 1Aii, 1Bi, and 1Di are all within a litre of one-another, as are the volumes of 1Dii and 1Bii (Figures 3.26-3.32). A consideration of the functional characteristics of each of these types adds weight to the suggestion that they were functional equivalents.

According to Henrickson and McDonald (1983, 632-3), restricted necks suggest the storage of liquid. Each of the types 1Ai, 1Aii, 1Bi, 1Bii, 1Di, and 1Dii, possess this characteristic. If used to contain liquids, the similar levels of neck restriction of each of these types (Figure 3.32) would restrict access to the contents but prevent spillage and evaporation, and also facilitate pouring. The largest vessels (1Ai) may represent longer-term storage, but given their volumes, they are not so bulky that they would be immobile when full – perhaps they were just used in situations that required more produce (Figure 3.31). In contrast, the volumes of the smaller Group 1 vessels (1Aii, 1Bi and 1Di and the smaller 1Bii, and 1Dii) would make them considerably easier to move. The small diameter mouths of all urns in Group 1 (Figures 3.26-3.28), along with their slightly everted and upright rims, would also facilitate closure by a skin or textile cover and it is interesting that McKinley (1994, 103) observes that whilst some urns from Spong Hill did have ceramic lids, others appear to have been sealed with some perishable materials such as leather or cloth. Although no vessels were identified with lids at either Cleatham or Elsham, a survey of published cemetery reports demonstrates that ceramic lids are more commonly found with vessels in Group 1 (Table 3.8 and Figure 3.46). These observations correspond with Henrickson and McDonald's (1983, 632-3) findings that narrow mouthed vessels are more frequently associated with lids, and that such lidded vessels are commonly associated with the storage of liquid.

Cemetery	County	Urn Number	Fig.	Reference	Form Group
Baston	Lincs	42	10	Mayes and Dean 1976	1Bi
Spong Hill	Norfolk	1360	36	Hills 1977	1Bi
Spong Hill	Norfolk	1085	70	Hills 1977	1D
Spong Hill	Norfolk	2483	51	Hills *et al.* 1987	1Ai
Spong Hill	Norfolk	2586	52	Hills *et al.* 1987	1Ai
Spong Hill	Norfolk	2531	52	Hills *et al.* 1987	1Bii
Spong Hill	Norfolk	2642	53	Hills *et al.* 1987	1Bi
Spong Hill	Norfolk	2056	51	Hills *et al.* 1981	1Ai
Spong Hill	Norfolk	1835	73	Hills *et al.* 1981	1Ai
Spong Hill	Norfolk	1875A	74	Hills *et al.* 1981	4Aiii
Spong Hill	Norfolk	1875B	74	Hills *et al.* 1981	4Aiii
Spong Hill	Norfolk	1936	80	Hills *et al.* 1981	4Aii
Spong Hill	Norfolk	1806	81	Hills *et al.* 1981	1Bii
Spong Hill	Norfolk	1963	82	Hills *et al.* 1981	?
Spong Hill	Norfolk	1991	88	Hills *et al.* 1981	?1Bii
Spong Hill	Norfolk	1784	88	Hills *et al.* 1981	1Biii
Spong Hill	Norfolk	1778	89	Hills *et al.* 1981	1Ai
Spong Hill	Norfolk	2090	89	Hills *et al.* 1981	1Bii
Spong Hill	Norfolk	2099	90	Hills *et al.* 1981	1Ai
Spong Hill	Norfolk	1772	90	Hills *et al.* 1981	1Bi
Spong Hill	Norfolk	2035	91	Hills *et al.* 1981	1Bi
Spong Hill	Norfolk	1753	92	Hills *et al.* 1981	?1Ai
Spong Hill	Norfolk	1791	101	Hills *et al.* 1981	4Aiv
Spong Hill	Norfolk	2048	100	Hills *et al.* 1981	1Ai
Spong Hill	Norfolk	2111	105	Hills *et al.* 1981	4Aiii
Spong Hill	Norfolk	1892B	104	Hills *et al.* 1981	1Bi
Spong Hill	Norfolk	2011	119	Hills *et al.* 1981	1Bii
Lackford	Suffolk	49,18(6)	15	Lethbridge 1951	1Ai
Lackford	Suffolk	48,2494(HG, 13)	15	Lethbridge 1951	?5Aii
Lackford	Suffolk	50,17(A,8)	15	Lethbridge 1951	?1Ai
Caistor by Norwich	Norfolk	1556	275	Myres 1977	?2/3
Newark	Nottinghamshire	3556	276	Myres 1977	?

Table 3.8: Survey of lidded urns in published cemetery reports. Note that the majority of these urns belong to groups 1A, 1B, and 1D.

With the idea that some form types operated as functional equivalents, it is interesting to note that the communities using Elsham produced few 1B vessels, yet they used 1D urns extensively. At Cleatham the opposite situation was noted; 1B was common, but 1D was relatively rare. What we are possibly seeing here, then, is that these communities were producing what are essentially micro-style variants of functionally equivalent pots. We can suggest a similar situation or functional equivalents with urns in Groups 2 and 3. Both types are 'squat' and have unrestricted necks (Figures 3.24, 3.34 and 3.35). As the mean heights of urns in Groups 2Ai, 3Ai and 3Bi, at both Cleatham and Elsham, lie between 187-225mm and there are only a few millimetres between the means and standard deviations of the rim diameters (Appendix B), it is suggested that they may have served similar functions; certainly, there would be little difference in a user's ability to access the contents of any of these vessels and all three have average volumes in excess of 5 litres (Figure 3.31).

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Figure 3.46: Lidded urn from Spong Hill. The form of this urn should be classified as 1Bii (Hills *et al.* 1987, Figure 51).

In addition to the similarities in rim diameter, height and volume, all urns in Groups 2 and 3 have low centres of gravity, and almost all have flat, wide bases; they therefore offer a considerable level of stability. On the other hand, these characteristics, along with their wide mouths would mean that it would be difficult to pour from them. Although the slight narrowing from the maximum diameter through to the mouth would provide some level of protection against spillage, if one attempted to move them there would be more chance of the contents escaping than if a Group 1 vessel was moved. Despite this, the stability and wide mouths would mean that it would be very easy to stir the contents and scoop or ladle them out. Perhaps, then, they may have been involved in processing or communal consumption activities, where the contents were mixed or transferred to other vessel types. Certainly, the largest volume types of 2Ai, 3Ai and 3Bi, would be particularly well suited for communal consumption.

Although stirring, dipping, or ladling may still be a viable means of manipulating and removing produce from 4Ai pots, these slightly larger heights (than Groups 3Ai and 3Bi) along with the reduction in mean rim diameter (Figures 3.20 and 3.32), result in a slight decrease in accessibility. Despite this, these characteristics mean that they would be easier to pour from and that there would be less chance of spillage if moved. The dimensions of smaller Group 4 urns (4Aii and 4Aiii) would similarly inhibit a user's ability to stir, dip and ladle out the contents, yet their narrower and marginally longer necks (than 4Ai), would make them more suitable for pouring, whilst slightly everted rims would allow affixation of a skin or textile lid. Such characteristics might allow urns of 4Aii to be used in a similar manner to those in Group 1, a point which is supported by the fact the mean heights, maximum diameters and volumes of the 4Aii urns are almost identical to those of 1Di and 1Aii (Figures 3.30 and 3.31 and Appendix B). The functional properties of Group 5 urns are very similar to those of Group 4. Indeed, their slightly taller bodies make their contents less accessible and this increase in height also makes them, according to Henrickson and McDonald's (1983, 632-3) study of functional properties of pottery, appropriate for longer-term storage of produce.

Vessels belonging to Group 6 have similar functional properties to those belonging to Group 1. Indeed, the Ratio 5 values of urns in this group draw similarities with those in Group 1A and 1B (Figure 3.29), whilst their average volume is identical to that of Cleatham's 1Ai urns (Figure 3.31). It is suggested here, then, that this Group 6 might actually be a very large version of Group 1B. The slightly wider appearance of urns in this group might simply be a consequence of these vessels requiring extra stability due to their larger volumes. Their extra width would certainly provide a lower centre of gravity and therefore increase their stability.

Urns belonging to the miniatures group are the smallest in the taxonomy. Their volumes and dimensions reveal that they held little produce and suggest that they were very portable, could be comfortably held in the hand and required little effort to fill. Their size suggests that they would be unsuitable for storage but they would be suitable for personal or communal consumption. Intriguingly, the mean height and diameter of this group suggest that these urns could easily pass through the mouths of the vessels with the largest rim diameters, that is, 2Ai, 2Bi, 3Ai and 3Bi. It is perhaps no coincidence, then, that these are the vessels that are most functionally suited to communal consumption and removal of the contents by dipping and ladling.

Having examined the functional properties of each of the groups and compared this with use-alteration data, we can now consider the functional properties of vessels used in the production of fermented beverages in ethnographic literature and historical sources. By doing this we can begin to suggest the roles that each Anglo-Saxon type may have fulfilled in the production and consumption of fermented produce.

'Make us a Brew'

We know very little about the techniques of brewing within the early medieval period. However, as the process appears to be very similar across time and cultures it is worth gaining an understanding of the basic procedures, so that we can begin to consider how the various early Anglo-Saxon vessel types might have functioned in the production and consumption of fermented drinks. First a mash is produced by mixing boiled water with either malted or unmalted grains. The process of mashing is a key step in the production of fermented beverages; it produces a saccharified liquid called a wort (later in the brewing process the sugar in this liquid will be used by the microbes that cause fermentation to take place). Once the wort has cooled the spent grain may or may not be removed from it. At this point the bacteria and fungi that cause the fermentation to take place may be added to the wort in the form of yeast. This is not a necessary ingredient, however, as levels of airborne microbes and fungi are often sufficient to begin spontaneous fermentation. In a similar vein, if the wort is left to ferment in vessels made of porous material, such as wood or low fired ceramic, and this vessel has already been used to make fermented produce, then the process will be initiated by starter cultures already present in the vessel wall. At this stage the beverage is left to ferment (Arthur 2003, 519; Clark 1983, 100; Corran 1975, 12-19; Dietler and Herbich 2006, 400-2; Garine 2001, 194-5; Stone 2006, 15-16).

The fermentation process is a relatively short one. Indeed, the whole procedure, from the cooling of the wort to the final fermented product being drawn from the fermentation vessel, is normally completed within two to eight days. If hops are not added to the wort the resultant beverage (ale) has poor keeping qualities and it has to be consumed within a few days (Clark 1983, 24; Dietler and Herbich 2006, 40; Stone 2006, 16). In contrast to ale, hopped beer has greater keeping qualities, but as hopped beer was not introduced to England until c.AD 1400 (Corran 1975, 42-4), it is highly likely that early Anglo-Saxon fermented drinks were un-hopped and therefore had to be hastily consumed.

As noted above, grain may or may or may not be malted before it is used to make a mash, although malting does increases the sugar content and makes for a more efficient fermentation. Malting involves soaking the grain in water so that the grains begin to germinate. The germination produces an enzyme known as diastase which converts un-useable sugars, held in the starch, to useable sugars that will be used in the fermentation process. To prevent the grains from growing into seedlings, and using up all these useful sugar, the brewer has to allow the grains to begin germinating but then stop them from developing further. Suspension of germination is accomplished by carefully drying the grains. Drying may be achieved either by heating in a ceramic vessel or by the use of specialist malting ovens. Grains may also be dried naturally, although their keeping qualities are vastly reduced. Not only does drying stop germination, it also preserves the enzymes and starch, and it is not until the malt is rehydrated in the production of wort that the enzymes are reactivated and able to release the useable sugars (Corran 1975, 12, 25; Dietler and Herbich 2006, 40).

With an understanding of the process and stages of brewing we can begin to consider the properties of vessels used in each step and how these may relate to the types identified in the taxonomy of Anglo-Saxon vessel form. In this respect we must consider examples where vessel properties, and the way in which the vessels are used, are well documented. Unfortunately, there is little in the way of written records from the medieval period that might allow us to gain an understanding of the various vessel forms used in each of the stages in the process. Ethnography, does, however, provide us with a window into the properties of vessels. Ethnographic examples, taken from studies of the Muzey and Duupa (Cameroon) (Garine 2001; de Garine 2011), the Luo (Kenya) (Dietler and Herbich 2006), and the Gamo (Ethiopia) (Arnold 2002; 2003), therefore provide us with a starting point in the following discussion, and these are then supplemented with the scanty evidence from medieval England.

We have already seen the procedure undertaken by the Gamo of Ethiopia (Chapter 2), in the production of their fermented drinks, but Figure 3.47 reviews the process and incorporates details of the vessels used in this process. This should be compared with Figures 3.48 and 3.49, which show the vessels and stages of brewing and consumption as undertaken by the Luo (Kenya) and the Duupa (Northern Cameroon). In the first stages of production, when the grain is soaked to release sugars or begin germination, the vessels used are generally broad and wide mouthed, although sizes vary considerably (Figure 3.47 and 3.48). The accessibility of such vessels allows for easy mixing, stirring and removal of the grain/flour. Vessels belonging to Groups 2 and 3 in our Anglo-Saxon typology would be particularly suitable for such procedures (Figures 3.24, 3.34 and 3.35).

Once steeped, the grains/flour may be dried, allowed to germinate, cooked or malted, used to produce the wort, or advance immediately to the fermentation stage; the latter is exactly the mode of production employed by the Muzey of Cameroon. After soaking, the Muzey remove the grain from the liquid and the resultant wort is used in the final fermentation (de Garine 2011, 136). The Gamo, on the other hand, do not separate the flour but allow it to remain in the liquid until the fermentation process is complete (Figure 3.47). The vessels in which the Gamo ferment (*otto* or *basta*) are of large volume, with narrow mouths and necks, and are sealable by either a skin lid or by placing a bowl or base of another vessel over the mouth (Figure 3.47). The pots in which the Luo ferment their mixture are of a similar form (*dak*) (Figure 3.48). Such characteristics are well suited to the storage of liquid and accord with Henrickson and McDonald's (1983, 632-3) observations that vessels used to store liquid are often narrow-mouthed and have lids. Significantly, the makeshift ceramic or leather lids do not merely help to keep the liquid inside but they actively modify the internal environment of the vessel, assisting fermentation. Indeed, the yeasts only produce alcohol if they are forced to respire in anaerobic and acidic conditions. The lids restrict the flow of oxygen into the vessel and help to maintain a 'carbon dioxide barrier on the surface of the liquid' (Dietler and Herbich 2006, 402). Anglo-Saxon vessels belonging to Groups 1Ai, 1Aii, 1Bi, 1Bii and 1Di, 1Dii and 4Aii are particularly suited for such tasks. Indeed, all have narrow mouths and necks that would allow closure by a skin, bowl or pot sherd; significantly, ceramic lids are most commonly found in association with urns belonging to Group 1 (Table 3.8). A further point to note is that the average volumes of such vessels (c. 4.5-8.0 litres) agree with the fact that un-hopped beers have poor keeping qualities (see above). If beer were being made by individual households for their own consumption, then, to prevent wastage by spoiling, relatively small qualities would presumably be the norm.

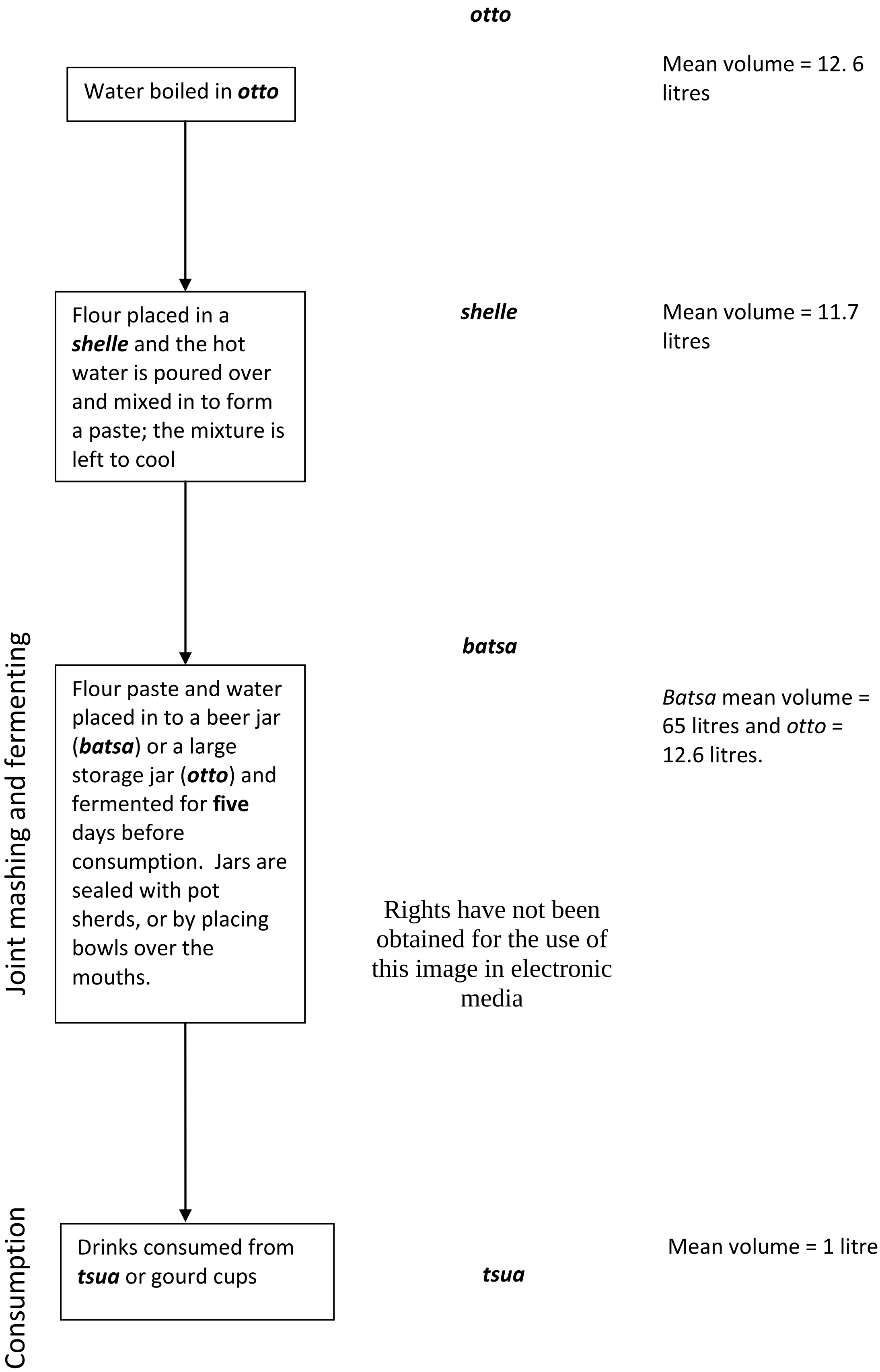

Figure 3.47: The process of beer production and consumption followed by the Gamo (Ethiopia) and the vessels used at each stage.

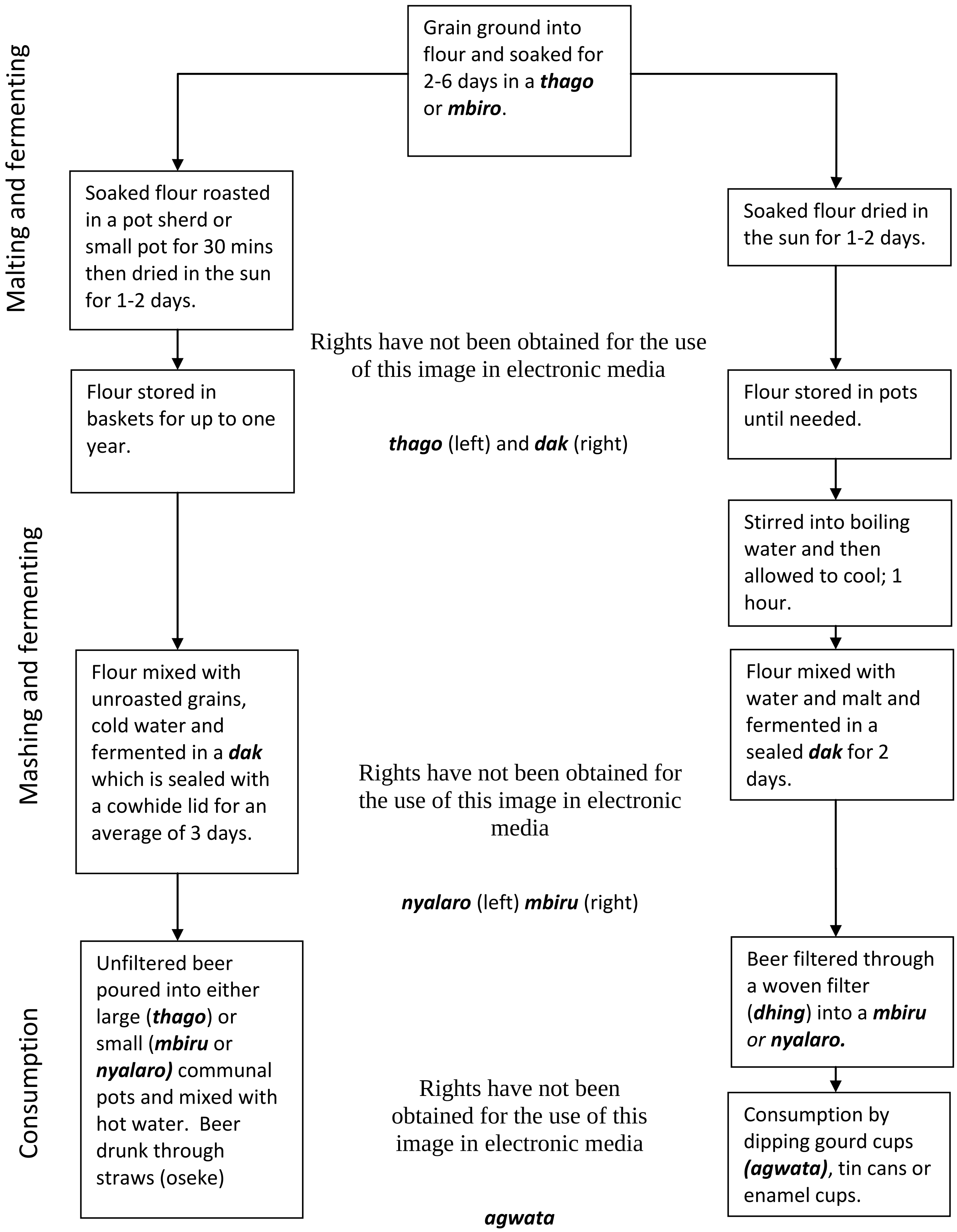

Figure 3.48: The process of beer production and consumption followed by the Luo (Kenya) and the vessels used at each stage.

Rights have not been obtained for the use of this image in electronic media

Figure 3.49: The stages in brewing *bumma* beer, followed by the Duupa of Cameroon (Garine 2001, Figure 16.3).

Before consumption of the beer, the grain/flour is separated from the liquid; this may occur at a number of stages in the production process. For example, if making unfiltered beer (*kwete*), the Luo pour the flour/water mixture into the serving *thago* or *mbiru* and as the beer is drunk through straws the separation occurs at the point of consumption (Figure 3.48). On the other hand, if making *otia* (filtered beer), the beer is poured from the *dak*, though a woven filter (*dhing*), into the serving vessels (*thago* or *mbiru*) (Deitler and Herbich 2006). The Muzey, by comparison, filter the liquid before the final fermentation (de Garine 2011, 136). We do not see any dedicated filtration vessels in the typology of Anglo-Saxon vessel form, but as discussed in Chapter 2, and in Perry (2012), when used in conjunction with a fibrous medium such as hay or straw, vessels with post-firing-perforations in their lower walls and bases could have served as adequate filters. Although perforations are not restricted to any particular type, and indeed we see that they are present in vessels as dissimilar as those belonging to Group 2Ai and the 'miniatures' group, this may simply represent different modes of filtration or that the filtering was undertaken at different stages in the brewing process (Figure 3.51).

Distribution and consumption are the final steps once all the stages of the brewing process are complete. The properties of the vessels used in these situations reflect the modes of distribution and consumption. For example, we have already seen that the Luo drink unfiltered beer through straws, while portions of filtered beer are drawn by dipping small containers into the liquid (Figure 3.48). Dipping requires a wide unrestricted neck, which the *thago*, *mbiru* and *nayalaro* all possess. If dipping was a mode of Anglo-Saxon serving, then the best-suited vessels are those with wide mouths, large volumes and low centres of gravity. Characteristically, such vessels belong to Groups 2 and 3, particularly 2Ai, 3Ai and 3Bi, although Groups 4Ai, and 6A possess similar qualities. Alternatively, distribution might be achieved by pouring quantities of beer from small narrow-mouthed vessels into individual bowls or cups (Figure 3.50). Such a mode of distribution in the Anglo-Saxon period might have been achieved by using small narrow-mouthed vessels like 1Aiii, 1Bii, or 1Dii, for instance, or even the 1Aii, 1Bi, and 1Di (Figures 3.26-3.28).

After distribution comes consumption and beer and this is normally achieved by using small portable vessels. For example, the Gamo use gourds and small jars (*tsua*), whilst the Luo gourds (*agwata*), tin cans and enamel cups (Figures 3.47, 3.48 and 3.50). Specifically, if drinking filtered beer, the Luo's drinking vessels need to be small enough so that they can be dipped, that is to say that they are able to pass through the mouths of the *mbiru* or *nyalaro.* Within the Anglo-Saxon typology, vessels such as 1Aiii, 1Biii, 3Aiii, 3Biii, 4Aiv, or 5Biii (essentially those of the miniatures group) would all be suitable for such the final act of drinking; indeed, all have volumes of c.1-1.5 litres, all have orifices of c.10-15cm that would allow them to be used as cups and all are extremely portable (Figures 3.30, 3.31, 3.32 and 3.43). Furthermore, given their size one might suggest that these vessels could be used in a fashion similar to the Luo's *agwata*, being dipped into large, wide-mouthed, communal serving pots. These small Anglo-Saxon vessels could easily pass through the mouths of vessels belonging to 2Ai, 3Bi and 3Bii, for example, which as suggested, might have functioned as communal serving vessels.

Figure 3.50: Muzey (Cameroon) beer consumption. Beer is poured from narrow mouthed jars into drinking bowls (de Garine 2011, Figure 13.1).

It is acknowledged that the discussion outlined in the preceding section focuses on ethnographic examples and it would useful to supplement the argument with English historical accounts. Despite the fact that there a small number of sources, dating from the thirteenth century onwards, which mention the names of vessels that are used in brewing, there are, unfortunately, no records that outline the process of brewing in England from the medieval period. Furthermore, as the accounts that do actually mention specific vessels derive from high-status and ecclesiastical sources (Corran 1975, 25-40), they do not represent the small-scale household production that we might expect in the early Anglo-Saxon period. None the less it is useful to consider some of these sources as they help to shed light on the process.

In a thirteenth-century treatise from Hertfordshire, Walter de Biblesworth writes that the 'vat' in which the barley is steeped should be 'large and broad' (Corran 1975, 25). The requirement of a 'broad' vessel correlates with the findings of the ethnographic studies discussed above, where open mouthed vessels such as the Luo's *thago* or *mbiru*, or the Gamo's *shelle* are used to soak the grain prior to fermentation (Figure 3.47 and 3.48). To this treatise we can add the inventories of medieval breweries, such as those from the parish of St Martin's, Ludgate, London, and the church of St Mary, Somerset, (dated AD 1335 and AD 1486, respectively). These inventories name some of the vessels used in the process of brewing; these include leaden cisterns, mash vats, fining vats, tuns and half tuns, ale vats, wort vats, coolers for wort, cisterns for holding water, mash tubs, water tubs and steeping cisterns (Corran 1975, 31-2). Although this demonstrates that brewing was an activity involving the use of multiple vessels, and multiple procedures, we are still left wanting for the process of medieval domestic production.

To the list of vessels named in inventories we can add information from household accounts that provide insight into the frequency of production and the keeping qualities of the resultant liquor. In the years 1307-8, at Bolton Priory, (Yorkshire) ale was brewed, on average, 6.4 time per month (about every five days), whilst in the years 1336-7, in the brewery of Katherine de Norwich, manufacture was undertaken, on average, 2.7 times a month (about every ten days) and produced 130-40 gallons (c.610 litres) (Stone 2006, 16). These medieval accounts are supplemented with documentary evidence from the Roman and later Anglo-Saxon periods. For example, in the first century, Tacitus records that the northern Europeans produced a 'liquor for drinking ... made out of barley or other grain, and fermented into a certain resemblance to wine' (*Germania* XXIII, xxxv; Church and Brodribb 1942). Similarly, Pliny the Elder records that the 'people of the Western world have ... intoxicating drinks, made from corn steeped in water' (*Historia* XIV, xxix; Bostock and Riley 1855). Both accounts, then, appear to suggest that on the Continent the grain was whole when soaked. Furthermore, in a late ninth-/early tenth-century remedy, reference is made to 'new ale before it be strained' (*Leechbook I*, li; Cockayne 1865, 125); the implication is that at some stage in the brewing process the solids were separated from the liquid and that the resultant ale was served filtered. With this evidence of form, duration of the process and the condition of the grain we can begin to suggest a hypothetical process for brewing in early Anglo-Saxon England, the vessels involved and duration of individual stages (Figure 3.51).

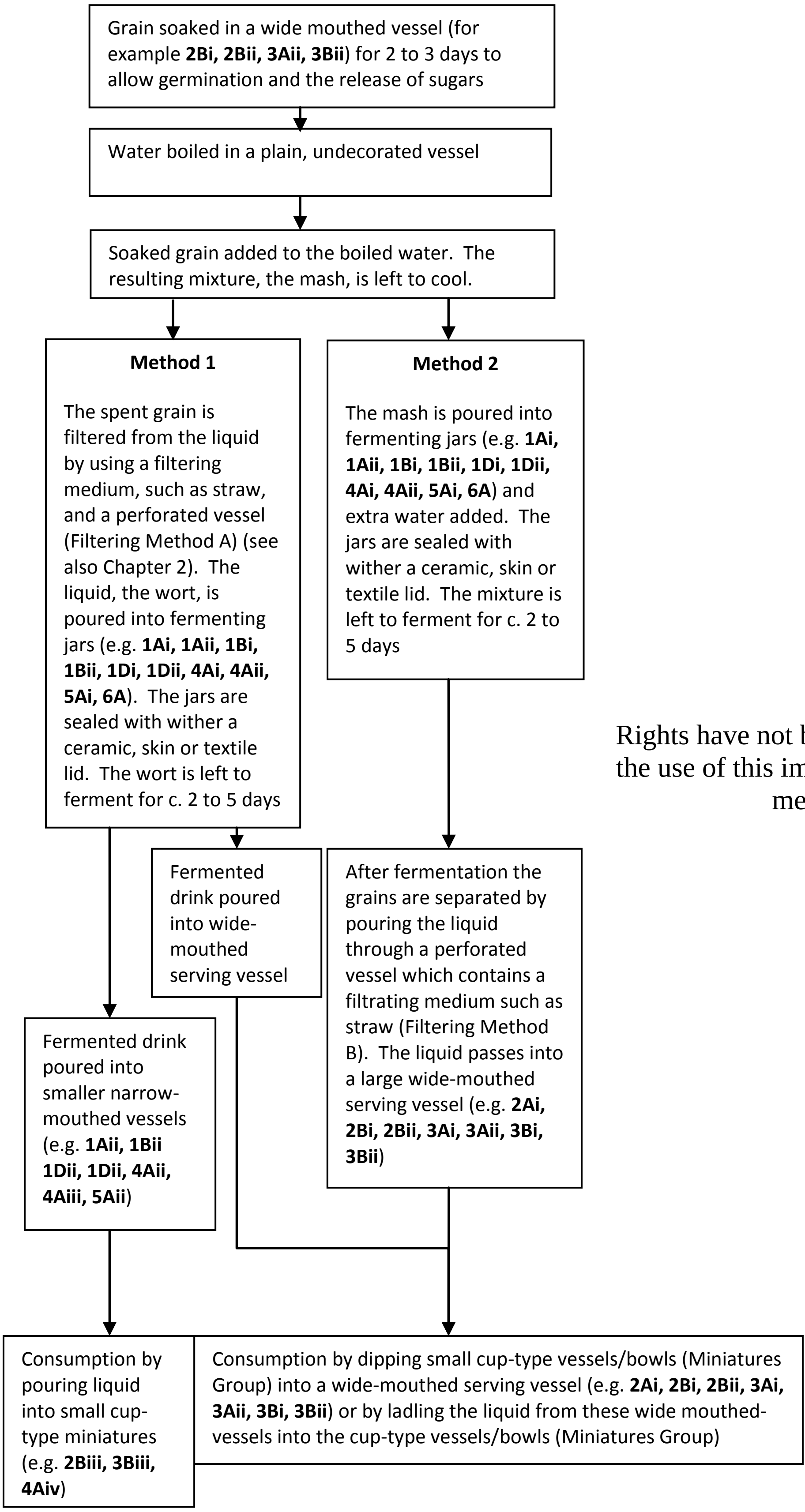

Figure 3.51: Hypothetical flow chart of early Anglo-Saxon beer production process, based on archaeological, ethnographic and historical sources (urn images from Leahy 2007c and Elsham excavation archive). All scale bars 10cm, see Figures 3.26 to 3.48 for additional details of form-types mentioned in flow chart.

Summary

This chapter has reviewed the previous approaches to Anglo-Saxon vessel form, suggesting that typologies have previously focused on arbitrary chosen characteristics and that there is no evidence that the previous classifications had any relevance to the people who created and used the pottery. Despite regularly criticising Myres's typology, analysts have repeatedly attempted to recycle, justify and redefine his types rather than developing entirely new taxonomies. As a consequence, with the exception of Richards's work (1982; 1987), our understanding of Anglo-Saxon vessel form has advanced very little in the last half century. By considering the form of vessels produced by modern pre-industrial societies it has been demonstrated that the features that form the core of Myresian taxonomic systems should be considered as minor variants of much wider themes. That is to say that biconical, sub-biconical, globular and shouldered types are merely micro-style variants of wider functional classes.

A review of the folk classification has demonstrated that indigenous taxonomies are rooted in vessel function but that people make distinctions between these functional types according to size and ratio-based characteristics. By ignoring whether a vessel is biconical or globular and considering vessels from the point of view of size and ratios, a new taxonomy of Anglo-Saxon vessel form has been developed. The taxonomy comprises six broad groups, each of which is sub-divided according to minor difference in ratio values and most sub-groups are divisible in to three sizes – small, medium and large. Classifying the pottery in this way reveals that potters had clear concepts of acceptable types and that they attempted to manufacture them according to relatively standardised increments of height and volume.

Many of the identified form-types might be considered to represent functional equivalents, for example, as urns of the form 1Bi and 1Di have similar volumes, heights, widths and rim diameters, they probably fulfilled the same functional roles. As there is a suggestion that some types are more common at Cleatham than Elsham, and vice versa, we might suggest that this tells us that different communities of potters were producing functional equivalents according to localised traditions. Such a suggestion accords with Herbich's (1987) idea of 'micro-style' variation. That is, although they might have been producing the same types of vessels, different communities of potters were manufacturing slightly different versions of these types. These localised variants result from localised 'conceptual traditions', which develop out of the learning patterns, motor habits, social relationships and *habitus* of the potters who produce them and the consumers who use them (Dietler and Herbich 1989; 1994, 464; Herbich 1987, 195-6). At this stage, however, we must be wary of drawing firm conclusions from the frequencies in which the various forms appear as only those vessels with complete profiles have been considered here. It is quite possible that the frequencies of occurrence would change considerably if the forms of vessels with incomplete profiles were also considered. Although the typology is based on vessels from just two cemeteries, it is clearly applicable beyond the bounds of North Lincolnshire. The idea of functional equivalents can be progressed further by considering the functional properties of individual types alongside the use-alteration data described in Chapter 2. Indeed, by taking such an approach, it has been possible to suggest the roles that these vessels may have played in the production and consumption of fermented produce.

Chapter 4

Decoration

Introduction

In 1855, after noting the similarity between English urns and those held in Hanover museum (Germany), J.M. Kemble proclaimed that 'the urns of the "Old Saxon" and those of the "Anglo-Saxon", are in truth identical … The bones are those whose tongue we speak, whose blood flows in our veins' (Kemble 1855, 280). This statement was to provide the blueprint for the study of urn decoration for well over a century. Indeed, as late as 1986 J.N.L. Myres stated that urns were 'invaluable' to 'providing us with a clue to which parts of the continental homeland … the different groups of the invaders came' (Myres 1986, 27). As the following discussion demonstrates, despite Myres's (1969, 120) suggestion that '[T]here are a great many ways in which the pottery of any primitive people can be expected to throw light on their habits and customs, their religious beliefs and artistic sensibilities, their economic conditions and their social arrangements' the main lines of enquiry into Anglo-Saxon vessel decoration have been concerned with dating, the identification of ethnic groups and movement of these groups and individuals throughout England.

This chapter aims to follow some of the avenues of research put forward by Myres. It compares the types of decoration found at the cemeteries of Cleatham and Elsham, revealing cemetery-based preferences and traditions, and explores the distribution of decorative types through the cemeteries. By focusing on the operational sequences followed by potters in the process of decorating, and the way that decoration is applied and arranged around these vessels, it is argued that we can gain considerable insight in to the way that cemeteries were organised, the environments in which pottery was produced, the relationships that may have existed between potters, and finally, the way in which decorative traditions evolved and were maintained.

Past Views

As with any study of early Anglo-Saxon pottery, we must begin with the prolific work of Myres. Myres focused on decoration as the primary means by which to classify the pottery and it is worth reviewing his reasoning behind this, his aims, his methodology and some of the conclusions that he drew. His taxonomy begins with the simplest form of decoration, with subsequent divisions increasing in complexity. Urns belonging to

‘Group II.1 – Horizontal Decoration’, for example, are defined by a band of incised or grooved lines around the neck. This group is then subdivided according to whether vessels also possess bosses, dots/jabs, faceting and/or stamps (Myres 1977, 16-17). The purpose of sorting the material in this way was, Myres claimed, so that further discoveries could be organised into ‘meaningful relationships with others of their kind’, but, by default, such categorisation allow ‘conclusions of a chronological or topographical nature’ to be drawn (Myres 1977, 12).

Myres saw these chronologies as being the key to understanding the introduction and development of Germanic styled pottery in England and a means by which to plot movement of the migrants throughout the landscape. He believed, for instance, that in the earliest stages of the ‘invasion’, potters were likely to ‘recall and to imitate the simpler forms of decoration familiar in their former homes’. However, ‘as time passed ... ornamental schemes would develop in their own way ... increasing in complexity and originality ... and diverging ever further from continental fashions’ (Myres 1969, 24). Put simply, modes of decoration that found parallels on the continent were thought to be early, whilst those that did not were thought to be later, insular, developments.

Myres’s views on the chronological development of decoration are best demonstrated by his discussions of *stehende Bogen* (standing arches) and panel-style stamped decoration. For example, whilst *stehende Bogen* are common in the traditionally Saxon and Frisian regions on the continent (the area between the Rivers Elbe and Weser (Germany) and westwards into the Low Countries) they are ‘virtually unknown’ in Anglian areas (such as Fyn and Schleswig). As scholars working on continental pottery dated *stehende Bogen* designs to the latter part of the fourth and the first half of the fifth centuries, Myres claimed that ‘their presence in England is a clear indication of the Saxon element among the new-comers and of their establishment here well before 450’ (Myres 1977, 29). In contrast, he suggested that as panel-style stamped decoration, which is common in sixth-century England, has so few parallels on the continent that ‘it seems to have been an almost purely English development’ (Myres 1969, 58).

The extent to which urns were seen as a reflection of the movement of ethnic groups and individuals is demonstrated by Myres’s interpretation of the distribution of footed and un-footed Saxon *Bucklurnens* (urns decorated with elaborate bosses) and the ‘face-urn’ from Markshall (Norfolk). In discussing the movement of people who preferred their *Buckelurnen* with an applied foot-ring , in comparison with those who preferred it without, he reported that '[t]he distribution of the former seems to fan out from the Humbrensian area over the Northern Midlands, while the latter appear to spread rather from East Anglia south-westward through Middle Anglia to the upper Thames valley and to have penetrated at quite an early stage as far as such Berkshire sites as Harwell and East Shefford' (Myres 1969, 101-2). The implication here is that, as footed *Buckelurnen* are common in the Elbe-Weser region of Germany, it is possible to date and chart the movements of these Germanic folk throughout England purely on the distribution of a type of decorated urn. He went even further when commenting on the 'face-urn' from Markshall (Norfolk), on which the bosses are decorated in the style of human faces, stating that it is so similar to urn 58 from the cemetery of Wehden (Germany) that 'it is indeed difficult not to believe that these two urns are the work of the same potter' (Figure 4.1), although he did acknowledge that it is impossible to determine whether the urn was imported from Germany to Norfolk, or vice versa (Myres 1973, 237).[1]

Figure 4.1: 'Face-urns',Urn LXX, Markshall (Norfolk; left); urn 58, Wehden (North Germany; right) (Myres and Green 1973, Plates X and XI).

Over the last 40 years Myres's approach to the grouping and dating of urns has been met with severe criticism and the following provides a brief *résumé* of the problems highlighted (for a full account see Dickinson 1978; Kidd 1976; Leahy 2007a; Morris 1974; Richards 1987). Dickinson (1978, 333) has pointed out that he frequently placed undue emphasis on specific elements in order to classify urns; the presence or absence of a foot ring, for instance, was used to draw together a selection of vessels with otherwise very different characteristics. Similarly, although Myres drew parallels with continental vessels, and used them to apply dates to the English material, he never

[1] A petrological study of these vessels would, however, answer such a question.

defined ‘how far and in what respects two vessels must resemble each other to be called parallels’ (Kidd 1976, 202). Moreover, many of the continental vessels that were used to date the English urns had themselves been dated by comparisons drawn with English pots (Morris 1974, 227).

A number of authors have advanced alternative methodologies to those of Myres for the classification and study of decoration. For example, in studying the material from the cemetery of Loveden Hill (Lincolnshire), Fennel (1964) grouped vessels into three classes according to whether they were plain, had linear decoration, or were stamped. Each class was then subdivided according to the morphological ratios of height to width, and rim diameter to maximum diameter (see Chapter 3). He did not, however, make any attempt to explain the reason behind such an approach or what one might hope to demonstrate by analysing decoration in this way. Further problems with Fennel’s study have been identified by Richards (1987, 28). Indeed, Fennel’s system of categorisation means that two vessels possessing exactly the same mode of linear ornamentation can be placed in completely different groups simply because of the presence or absence of stamps. Despite his methods, Fennel’s end goal was extremely similar to that of Myres and after sorting the material he attempted the identification of continental parallels in order to determine the chronology of settlement in southern Lincolnshire.

In her analysis of Spong Hill, Catherine Hills (1977, 12) sorted decorated pottery into groups defined by the presence of linear, plastic (the addition of more clay, or the extrusion of a part of the vessel body to make ridges or bosses), and indented decoration (including stamps and finger-tip impressions). Like other authors, Hills (1993) attempted to identify continental parallels for the English materials, however unlike Myres she did not focus on a single form of material culture or highlight individual vessels, stating instead that it is ‘not ... sufficient to find one or two pots or brooches in England which look like some in Germany to demonstrate immigration’ (Hills 1993, 16). She compared the whole burial assemblage from Spong Hill with those assemblages excavated from sites on the continent, which revealed that assemblages of grave goods from Spong Hill were very similar to those from Süderbrarup and Bordesholm (Germany), both of which are cemeteries in the traditionally ‘Anglian’ area of the continent. On the other hand, although much of the decoration seen on the Spong Hill pottery could have had an Anglian ancestry, the most frequent styles are in keeping with those found in the cemetery of Westerwanna

(Germany), which is located in the traditionally 'Saxon' area of the continent. She reports that 'the people buried at Spong Hill owed many of their ideas about how to bury the dead to ideas current in Schleswig-Holstein [the Anglian area of the continent] ... [but], for some reason, after a generation or two, most of their pottery was decorated in a style derived from Saxony' (Hills 1993, 19-22). Although she does not explicitly state it, her observations imply that what we are dealing with at Spong Hill is a culture whose practices cannot be identified as specifically 'Anglian' or 'Saxon', but rather these people and their material culture are the product of an amalgamated society with diverse cultural origins.

A further approach to the study of urn decoration has been developed by Kevin Leahy (2007a). Leahy was clearly aware of the dangers in drawing continental parallels, the application of dates, and identification of ethnic affiliation. Therefore, in his study of the urns from Cleatham, he focused on the stratigraphic relationships between urns in order to 'phase' decorative groups. In doing so he was able to investigate the growth of the cemetery and the evolution and development of ceramic fashions (see Chapter 1). Leahy's system is the most transparent and rigorous decorative classificatory system of any of the published studies of Anglo-Saxon pottery. The clarity of his taxonomy means that further discoveries, and indeed those vessels already excavated, can be (re)categorised easily and with confidence. Although his system is based on the material from a single cemetery, he did attempt to test its validity beyond Cleatham. Given the similarity in modes of decoration across the country, he was able to group and, thus, 'phase' urns from other cemeteries. These phases were then compared with the grave goods associated with the urns and, encouragingly, he reported that earlier and later grave goods correlated with earlier and later phase decorative styles (Leahy 2007a, 89). However, as the system has only been tested against associations of dateable artefacts with paralleled pots, and not against stratigraphically related pots in other cemeteries, one must be wary of wholesale application of phases to vessels in other cemeteries. Fortunately, as stratigraphic relationships between urns were recorded at Elsham it will be possible to test the applicability of Leahy's phasing beyond Cleatham (see below).

Stamp Groups and Potting Workshops

One line of enquiry into urn decoration which moves beyond classification and the determination of ethnicity and chronology, is the identification of vessels that were potentially produced by the same potter, or in the same workshop. Myres (1937, 391-2, 395-6) suggested that such pots can be identified on the basis of their shared stamps, groups of stamps, or same mode of complex linear decoration. By considering the frequency and distribution of these vessels Myres proposed that it might be possible to gain an insight into modes of production and gift exchange. The simplest form of production, he argued, is that represented by pairs of pots in the same cemetery, which were so similarly decorated, sharing the same stamp, and often buried in close proximity, that they may represent the work of a single 'household industry' (Myres 1969, 126-7). The next level is that of potters who were in 'business in a small way' (Myres 1969, 126-7). These potters produced vessels with a 'professional' finish and may have distributed surpluses between friends and neighbours, alternatively the potters producing such vessels may have catered for a large household. Archaeologically, this second situation manifests as four or five pots, of the same style, including the same stamps, in a single cemetery (Myres 1969, 126-7). By the late 1970s Myres (1977) had identified 157 such groups, and subsequently the identification of these potting workshops became commonplace in cemetery reports authored by a number of scholars (for example, Hills 1977; Hirst and Clark 2009; Kinsley 1989). The best example of this is provided by Spong Hill. Here Hills (1980, 204-6) has identified in excess of 40 stamp-linked groups, most of which consist of about five urns but the largest – Stamp Group 7 – contains 31. The characteristics and the distribution of these stamp groups, she suggests, demonstrate the use of specific areas of the cemetery by separate communities or families (see Figure 1.2).

Moving beyond this cemetery-specific level of manufacture, it has been suggested that there is evidence for larger-scale distribution and production. This is revealed by small numbers of stamp-linked vessels found in different, but proximal cemeteries. As these cemeteries are often no more than a few miles apart, for example, Girton and Newnham, or Girton and St. John's (Cambridge), Myres thought that the presence of stamp-linked pots may represent gifts obtained through marriage, the work of a small-scale producer who distributed their wares through a 'central market of some kind', the work of an itinerant potter, or the product of a female potter who after marrying into a different community took 'her pottery stamps and taste for decoration with her to her new home' (Myres 1937, 396; 1969, 127-8). Given that evidence for the production of pottery in the early Anglo-Saxon period reveals that pottery was being produced at the level of the individual household, for individual household consumption (see Chapter 1), it seems unlikely that such vessels were being distributed through a 'central market'. It is perhaps, more likely, that similarly decorated vessels that found in cemeteries that are in close proximity to one another were the products of people moving with their pottery, gift exchange, or potters relocating.

Myres thought that itinerant producers might be responsible for vessels that are similarly decorated but distributed over considerable areas, such as those thought to have been produced by the so-called Sancton/Elkington (Figure 6.4) and Sancton/Baston potters (Figure 1.9), for example. Indeed, Sancton/Elkington vessels have been found at cemeteries as far as c.45 miles apart, at Sancton (Yorkshire) and South Elkington (Lincolnshire), as well as at Cleatham and Elsham in between (Leahy 2007a, 127-8; Myres 1969, 129). Those vessels attributed to the Sancton/Baston potter are even more dispersed, being identified at Sancton (Yorkshire), Baston, Loveden Hill, Cleatham, Elsham (all Lincolnshire), Illington (Norfolk), Newark (Nottingham), and Melton Mowbray (Leicestershire) (Figure 1.19) (Myres 1977, Figures 347-8; Leahy 2007a, 128-9).

Although Myres (1937, 394-6) saw vessel groups that were linked by the presence of identical stamps and complex linear decoration as being the product of the same hand, recent analysis suggests that this was probably not the case. Arnold and Russel's (1983) study of vessels attributed to the Sancton/Baston potter demonstrates that, although very similar, in most cases stamp dies used on different pots were not in fact identical. Moreover, the clay sources used to make these vessels were cemetery specific. As a consequence, they concluded that it 'seems doubtful that we can envisage a "potter" or "workshop" being responsible for the group as a whole' (Arnold and Russel 1983, 25). As an alternative they suggested that the similarity in form and decoration may have some 'heraldic or totemic significance ... to a family or kin group' and that the vessels might be the product of a single 'lineage'; their occurrence in multiple cemeteries was thought to be the result of members of the lineage/kin group relocating, perhaps for reasons such as marriage, and then continuing to make pottery in the fashion to which they were accustomed (Arnold and Russel 1983, 27). Of the Sancton/Elkington pots, Leahy (2007a, 128; 2007b, 50-1) has drawn attention to the fact that there is considerable variation in the quality of forming, the application of decoration to pots, and a lack of consistency between the ceramic fabrics of each urn, both within and between the cemeteries. This, he suggests, indicates that the pots should probably be seen as a regional style rather than the product of an individual potter or workshop. It would appear, then, that whilst larger scale production was initially thought to be responsible for these regional styles, it now seems that they were in fact household products that were following wider regional traditions.

The largest scale of production identified by Myres – the household industry – is only evidenced by a single group of pottery, the groups attributed to the late sixth-century, so-called Illington/Lackford potter (Figure 1.12). Over 100 examples of this type have been found on no less than ten sites throughout Suffolk and it is thought that they represent the nearest thing to commercial production in the early Anglo-Saxon period (see Chapter 1 for a full discussion) (Myres 1937, 391; 1977, 349-56).

In common with Myres, T.C Lethbridge believed that stamps were 'the key to our Saxon pottery', being equivalent to the potter's signature and as such he saw that '[n]o publication of an Anglo-Saxon cemetery ... should omit a detailed study of the stamps' (Lethbridge 1951, 14). In response to a request from Lethbridge to assist in the classification of decoration, stamp groups and potting workshops, Teresa Briscoe established the Archive of Anglo-Saxon Pottery Stamps (Briscoe 1981). Briscoe's archive is organised such that all early Anglo-Saxon pottery stamps are classified and recorded according to a standardised typology, with casts and rubbings being taken of all known examples of stamped pottery. These records allow comparison of material on a site by site and region by region basis, in order that distributions of types can be identified and stamps deriving from the same die recognised (Briscoe 1981). The establishment of this archive has gone a long way to satisfying Lethbridge's desire for detailed study of stamps and stamp groups in published cemetery reports (for example, Hills 1977; Hills 1980; Hills *et al.* 1994; Hirst and Clarke 2009; Kinsley 1989). To a large extent, the study of these stamps and stamp groups has become the main thrust of investigation into urn decoration. For example, of over 400 pots recovered from Millgate (Nottingham) (Kinsley 1989), detailed discussion is devoted to those 53 pots that were attributed to one of fourteen stamp groups. The remainder of the urns are relegated to brief descriptions in the catalogue of finds.

Urns as Epitaphs

Richards's 1987 volume *The Significance of Form and Decoration of Anglo-Saxon Cremation Urns* marked a significant change in the way that archaeologists viewed the form and decoration of Anglo-Saxon cremation urns. On the basis of anthropological and archaeological studies by scholars such as Plog (1980), Weissner (1984), and

Pollock (1983) – who suggest that decorative styles are a form of communication that provide details about and maintain social boundaries – Richards proposed that urn decoration was actively manipulated as a means by which to communicate details about the deceased. He suggested that 'it should be possible to "read" a cremation vessel in an analogous fashion to that in which a tombstone may be read' (Richards 1987, 19, 42). Viewing the overall decorative scheme as a combination of elements such as chevrons, vertical, horizontal and diagonal lines, standing or hanging arches, and stamps, he attempted to correlate the constituent parts with grave goods and the age and gender of individuals within the urns (Richards 1987, 65-9).

Richards examined 2440 urns, but due to varying levels of preservation and post-excavation analysis, he was only able to consider the ages and genders of the remains of 775 cremated individuals from the total 2440 urns. For these 775 burials particular aspects of urn decoration, such as incised chevrons, arches, or vertical and horizontal lines, were cross-tabulated and compared with attributes of the cremated remains, such as age and gender. Although the numbers were generally too small to reveal significant results, a small number of relationships were, nonetheless, noted. For example, pots with lines sloping to the right are about 75% less likely to contain children or young adults, while vessels decorated with slashes are about half as likely to contain the remains of children or young adults. Urns decorated with hanging arches are about half as likely to contain the remains of adults, but where they do it is more likely that the remains will be female and not male, and, finally, urns displaying upright or reversed chevrons are more likely to contain the remains of females (Richards 1987, 114-15, 167-8, Tables 20 and 54).

Although these relationships do suggest that decoration may have been a means by which to communicate details about the dead it must be borne in mind that they are not clear-cut nor are there very many of them. If one considers hanging arches, for example, although they are statistically less likely to contain the remains of adults and males, they are not the preserve of non-adult groups, nor are they restricted to females. Whilst Richards acknowledged that there were very few statistically significant results, little emphasis or clarification was given to how few there actually were; it is worth doing this here. Of the seventeen forms of linear incised decoration that were tested against nine age and gender skeletal groupings only *nine* statistically significant relationships were identified out of a possible 153 (data derived from Richards 1987, Table 54).

Having examined skeletal groupings, Richards moved on to consider whether urn decoration could be correlated with grave goods. Intriguingly, he reported that 'most grave goods exhibit distinctive links with categories of incised decoration' and that 'by implication, it is possible to predict from the design of a funerary vessel that it is more likely to contain some grave goods, rather than others, without any previous knowledge of the contents' (Richards 1987, 161-2). Amongst other relationships, he identified that: bronze tweezers are statistically less likely to be found in vessels decorated with chevrons; vessels with diagonal lines sloping to the left are more likely to contain combs, although there is no such link with those sloping to the right; urns decorated with dots are likely to contain bronze sheet, bronze tweezers, brooches, combs, iron fragments, or miniature iron tweezers and sheers; vessels decorated with standing arches are significantly linked with combs, iron fragments and rivets, miniature iron blades, sheers and tweezers, and worked flint; and, finally, stamped decorated vessels are statistically linked to glass vessels, miniature iron blades and miniature tweezers (Richards 1987, Tables. 52a-e and 65). Thus, it would appear that whilst there were few links between skeletal groupings and urn decoration, there are many more statistically significant relationships between urn decoration and grave goods.

Although these grave goods and urn decoration relationships may be statistically significant, there are considerable problems with Richards's sample and he gives little consideration to how these relationships might develop. Indeed, of the 2440 urns considered, 675 come from Spong Hill (28%), and these, along with a further 1213 from five other cemeteries, account for 77% of the total number of urns studied (Richards 1987, 58). Richards's data set is, therefore, heavily biased towards a very small number of cemeteries. Moreover, if we consider the apparently significant relationships on a cemetery by cemetery basis, it becomes clear that we cannot 'predict from the design' what the urns might contain. For example, if – as Richards's statistics suggest – there is a high probability that urns decorated with standing arches will contain a bone comb, then, as standing arches are more common at South Elkington than at any of the other cemeteries in his study (Table 4.1), we would expect to see at least a small number of bone combs among the grave goods of this cemetery, and perhaps, proportionally, even more than at any other. Yet, this is not the case; no combs were identified at South Elkington (Richards 1987, Tables 1, 9, 17, 18, 52a-e and 65).

Site	Number of urns	% of urns with standing arches	% of urns with grave goods	% of urns with grave goods that include bone combs
Sancton	243	4.9	56.0	14.0
Spong Hill	675	8.3	63.7	13.0
South Elkington	91	12.1	22.0	0.0
Illington	94	1.1	34.0	13.8
Mucking	77	3.9	31.2	0.0

Table 4.1: The relationship between standing arches and bone combs. Data derived from Richards (1987) Tables 1, 9, 17, 18 and 52(c).

A very important insight to emerge from Richards's study is that despite identifying a high level of consistency between the types of urn decoration present at each cemetery, his comparisons also demonstrate that on a cemetery by cemetery basis there are differences in the frequencies with which particular types of decoration occur and the ways in which particular motifs are used. For example, he determined that at most cemeteries c.40% of urns are stamped (Elsham = 41%, Newark = 41.5%, Spong Hill 39.1%, Loveden Hill 41%), yet at Mucking only 11.7% of pots were stamped, 26% at Caistor, but 60% at Illington. Variation in the way that the stamps were used is also evident. Potters producing stamped urns at Elsham, for example, had a propensity for using just one stamp-type per urn, but at Illington the use of two or three per urn is more common. Although there are similar proportions of stamped urns at Elsham and Spong Hill (41.0 and 39.1%, respectively) there are, on average, more impressions per urn at Spong Hill (Richards 1987, 100-4).

Comparable variation to that seen in the use of stamps is also evident in the use of incised lines. For example, although bands of horizontal lines around the necks of urns occur on c.75% of all pots at all sites studied by Richards, at Caistor there is a tendency to have fewer than two bands, but at Illington and Lackford the preference is for more than two (Richards 1987, 99). Similar patterns in variation are observable in the use of chevrons and standing arches. For example, upright chevrons are more common than reversed chevrons at Caistor, Elsham, Illington, Lackford and South Elkington, but at Mucking, Loveden Hill, Sancton and Spong Hill the reverse is true. Likewise, more urns are decorated with hanging arches than standing arches at Illington (18.1% vs. 1.1% of the decorated vessels), but standing arches are more frequent at South Elkington (4.4% vs. 12.1%). At other sites the proportions are roughly equal and always less than 8.3% (Richards 1987, Table 9).

Cemetery-based variability is not just restricted to decoration; indeed, it also extends into the use of grave goods. We have already seen that whilst combs were found in urns at Spong Hill, Elsham and Sancton, they are absent from those found at South Elkington and also Mucking. To this differential use of combs we can add variability in the occurrence of miniature toilet equipment; at Caistor, for example, miniature iron tweezers and shears account for 11.5% and 11% of grave goods respectively, yet at Elsham these artefacts account for just 3.9% and 1.5% respectively. On the other hand, glass artefacts account for 17.6% of grave goods at Elsham but they are practically absent (0.9%) at Caistor (Richards 1987, 109-10).

To summarise, then, although there appears to be a consistent range in the types of grave goods and urn decoration from which the early Anglo-Saxons drew, Richards identifies that on a cemetery by cemetery basis there are considerable differences in the way that grave goods and types of urn decoration were employed. With this observation in mind we must return to the apparent pattern of bone combs being statistically linked to standing arches. As was noted above, the cemetery of South Elkington had the greatest proportion of standing arches, but despite this, no combs were identified in the cemetery's assemblage of grave goods. We might suggest, then, that the funerary practices of the people burying their dead at South Elkington dictated that the inclusion of combs within the urn was not an appropriate mode of burial.[2] In contrast, the Spong Hill assemblage includes bone combs and urns decorated with standing arches. Whilst there is no denying that the observed relationship between combs and standing arches might have been a real phenomenon at Spong Hill, the fact that the Spong Hill assemblage accounts for 28% (675 runs out of a total 2440) of Richards's data, and South Elkington just 4% (91 urns), the Spong Hill data (Richards 1987, Table 1), and therefore the burial practices of the Spong Hill folk, bias the analysis.

Although Richards did try to look at the various relationships between grave goods and types of urn decoration on a site by site basis, the reduction in numbers meant that problems were encountered with levels of significance. The only site in which there was adequate data to obtain results with which to compare to the total dataset of 2400 urns was Spong Hill, and unsurprisingly, this site showed the same

[2] One might question whether the absence of combs at South Elkington is due to them not being identified in post-excavation analysis. This is not the case; they were not identified because there were not there to be identified. Indeed, there were almost no grave goods found in the urns in this cemetery – see Webster and Myres (1951).

patterns between grave goods and decoration as had been observed in the larger survey of 2400 urns. That Spong Hill affected the overall analysis is supported by the relationship between combs and stamps. At Lackford, Richards observed that there was tendency not to put combs in stamped urns. When he tested this observation on a Lackford-only basis, he found that this pattern was statistically significant. This relationship between combs and stamped urns had not emerged in the cumulative analysis of 2400 urns, nor did it appear in the analysis of the Spong Hill assemblage (Richards 1987, 166-7).

Based on the above discussion, then, it seems unlikely that we can, as Richards suggested, "read" cremation urns in 'an analogous fashion to that in which a tombstone may be read' (Richards 1987, 19, 42). Indeed, while it does appear that there was a high level of consistency in the types of grave goods used by the Anglo-Saxons, and the modes of decoration with which they ornamented their cremation urns, when viewed on a cemetery by cemetery basis, we find that there is considerable variation in the way that these grave goods and urn decoration were employed. As such we should not expect that if we observe a relationship between a particular type(s) of decoration and grave-good(s) at one cemetery, that this relationship will be replicated at any other cemetery.

Finally, in the consideration of the relationship between urn decoration and other aspects of the burial we must consider the relatively recent work of Mads Ravn (1999; 2003). Like Richards, Ravn used statistics to explore the relationship between grave goods, urn decoration (notably, Ravn did not consider all forms of decoration, he only considered stamps) and the age and gender of the cremated individual. Ravn argued that, in order to fully understand burials, all elements of the burial needed to be considered holistically, rather than, as Richards had done, as a series of one-to-one relationships. Using Correspondence Analysis Ravn was able to simultaneously investigate the relationships that existed between multiple aspects of the burial. By taking this approach, and comparing it with Richards's method of analysis, he demonstrated how different statistical methods reveal contrasting results. Using Richards's cross-tabulation approach to the study of grave goods and burials, he revealed that a large proportion of stamps were associated with females, whilst others were associated with males. However, a multivariate approach using Correspondence Analysis revealed that some of the stamps that a cross-tabulation method associated with females, were in fact more strongly associated with masculine elements of burial.

For example, his stamp type XII, following Richards's method, was associated with females, but a multivariate approach shows this type of stamp to be related to elderly males (Ravn 2003, 108-10, 122).

Unlike Richards, Ravn did not attempt to prove or disprove that cremation urns were made for the burial, rather he was simply looking to identify relationships between multiple elements of the burial rite. He concluded that these funerary artefacts, including the urn, were the product of a selection process that was intended to 'conspicuously' express 'status, ethnicity, age and gender' (Ravn 2003, 129). Like the present author, Ravn also criticised Richards's blanket approach to the analysis of the burial data. Drawing attention to Richards's observations of regional variations in the use of urn decoration and grave goods, Ravn noted that by analysing the material *en masse*, and not on a cemetery by cemetery basis, Richards 'levelled out' his results (Ravn 2003, 127). That is to stay that cemetery specific nuances in burial practices were lost by undertaking cumulative analysis of data from a large number of cemeteries. He reports that it is inappropriate for scholars to ignore the regionality that exists in Anglo-Saxon England, suggesting instead that each cemetery and region should be analysed individually. Only once site specific analysis has been undertaken should they then attempt analysis on a regional and national level (Ravn 2003, 127).

Symbols and Signs

In this review of urn decoration, we must consider those studies that have suggested that decoration might be symbolic of pagan belief or invoke certain deities. Hills (1974, 88-9), for example, has reported on an urn decorated with a runic stamp, apparently spelling out the name if the pagan deity 'Tiw'.[3] In a similar vein, Myres (1969, 137) suggested that the use of swastikas as a decorative element might be associated with the god Thor, or Thunor. For Myres, this association was particularly strong when the swastika was accompanied by representations of serpents or dragons (he cites Illington urn 69 and Lackford urn 49.4 as such urns (Figure 4.2), but the present author remains to be convinced that this is what they are –the motif on the Lackford urn, in particular, looks more like a quadruped then a dragon), which he suggests may relate to a myth in which Thor fights the 'Cosmic Dragon or Serpent' (Myres 1969, 137). Reynolds (1980) builds on this Thor-swastika association when

[3] A recent interpretation, however, has translated the stamps as the word *ealu*, meaning 'ale' (Catherine Hills pers. comm.); this is, potentially, a very significant point in the context of this study (see Chapters 2 and 6).

reporting on a whetstone, also associated with Thor (Simpson 1979), found inside a swastika decorated urn from Sancton. Finally, mythological imagery has been suggested for an urn (R 9/10) from Caistor-by-Norwich, which appears to show a schematised longboat and barking dog (Figure 4.2). This depiction is thought to represent a scene from the Norse myth *Ragnarök*, the end of the cosmos, in which the wolf *Fenrir* features alongside a boat made of dead men's fingernails (*Naglfar*) (Myres and Green 1973, 118).

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Figure 4.2: Urns potentially associated with mythology. Urn 69 from Illington (top left) is decorated with swastikas and serpentine S-shapes (Davis *et al*. 1993, Figure 29). Lackford urn 49, 4 (top right) is decorated with swastikas and quadrupeds (Lethbridge 1951, Figure 8) which Myres interprets as 'dragons', whilst urn R9/10 from Caistor-by-Norwich(bottom) is adorned with imagery of a boat and barking dog (Myres and Green 1973, Figure 44).

Both the serpent and dog/wolf motifs described above were produced by freehand drawing in the surface of leather-hard clay. These are not isolated instances. Although few, and with some more believable than others, examples of zoomorphic imagery on urns are known from a number of cemeteries. Convincing quadrupeds are found at Lackford (Myres 1977, Figures 365 Nos 882 and 883) and Hills *et al.* (1987, Figure 73) illustrate a vessel from Spong Hill apparently decorated with a stag and dogs/wolves (Figure 4.3). To this freehand style we can add the very rare zoomorphic bossed urn from Newark (Kinsley 1989, Figure 31) – this urn is decorated with animals that were formed by the addition of clay. Finally, we have examples of animal imagery stamped into the surface of the clay, of which Eagles and Briscoe (1999) have identified 36 examples. These stamps have a relatively restricted distribution, being confined to just eight sites on either side of the Wash (Eagles and Briscoe 1999, 108).

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Figure 4.3: Spong Hill urn 2594, decorated with dogs/wolves and a stag (left). Lackford urn 48.2485 (right) decorated with quadruped animals (Hills *et al.* 1987, Figure 73; Lethbridge 1951, Figure 8).

We can only guess at the meaning of such imagery, but Williams (2001, 199; 2005) has suggested that they may represent animals that played specific roles in the cremation rite. As the majority of animal stamps appear to signify horses, while cattle and horses(which are associated with transport) are sometimes cremated whole and their remains included in the urn, Williams (2005, 29) proposes that they may signify otherworldly guides or shamanistic familiars. Furthermore, at Spong Hill, he notes that animal remains are 'slightly more likely' to be included in urns which are stamped (for example, 9.2% of urns are decorated with a circular stamp and contain animal bones, compared to 7.1% of urns decorated with a circular stamp that do not contain animal bones) (Williams 2005, 21, Figure 3.4) and as it is thought that the stamps themselves were often made of carved animal bone and antler (although examples made of other materials are also known; see below), the stamping of urns may have been seen as 'adorning the dead with animal elements' (Williams 2005, 24).

Summary

The above discussion reveals that, with the exception of the work of Richards (1987) and Hills (1993), studies of decoration fail to consider the bulk of the decorated pottery, tending instead to focus on restricted groups, such as stamp groups and continental parallels, or the exceptional, such as animal stamps. This is unfortunate as most authors would probably agree with Blinkhorn (1997, 117) that we cannot follow Myres (1977, 1) in suggesting that nothing of value can be drawn from the study of plain, undecorated urns. Yet, the same authors are apparently happy to relegate the bulk of the decorated pottery to basic descriptions in catalogues whilst a restricted group of more decorative or 'interesting' urns are examined and discussed in detail. We must ask, therefore, whether we can say anything about those vessels that do *not* have parallels on the continent, which have *not* been identified as belonging to stamp groups and potting workshops, are *not* adorned with zoomorphic imagery, or do *not* have decoration that appears to invoke certain deities? Likewise, if the pottery was not manufactured for the funeral (see Chapter 2), and decoration is not therefore the keeper of some epitaphic code that as archaeologists we are meant to decipher, then what is decoration and can we actually say anything interesting or meaningful about it?

Encouragingly, the studies discussed above do reveal patterns in the data that suggest fruitful avenues of enquiry. For example, the emergence of stamp groups, and development of elaborate stamping in general, seems to have been a distinctly English phenomenon and one which belongs to the sixth century (Hills 1980; Myres 1969; Ravn 2003). It has been suggested that stamp groups might represent the work of a family potter, and – as urns belonging to particular stamp groups are seen to cluster together in cemeteries – that families were burying their dead in family plots (see Hills 1980, for example). If this elaborate stamping was a late phenomenon, then we must ask how it evolved and how it spread. Likewise, if stamp groups are indicative of family membership, can we identify a comparable practice in the fifth century with similarly decorated, unstamped urns, clustering together in the cemeteries?

In a similar vein to the evolution of elaborate stamping, Richards (1987, 100-4) demonstrated that although there was a high level of consistency in the types of motifs found in cemeteries across the country, there are considerable differences in the way they were employed and the frequencies with which they occur at different cemeteries. It would appear, then, that localised preferences for specific types of urn decoration developed; this is further evidenced by Eagles and Briscoe's (1999, 108) observation that animal-shaped stamps seem to be a regionally specific phenomenon, being restricted to sites on either side of the Wash. Despite these observations, no one has asked why and how these local traditions develop. It is suggested here that such questions have not been posed as urns are almost always viewed as finished articles with little or no consideration being given to the choices that the potter made at each stage of the decorating processes, the agency of the potter, the potter's learning process, their relationship with other potters and the rest of the community, or the cultural constraints in which they operated. As will be demonstrated below, by viewing decoration as a social product and result of a *chaîne opératoire*[4] we can gain considerable insight into the way that decoration was applied and developed, the spread of ideas, emergence of community/regional traditions, and the organisation of family/community burial plots within the cemeteries. As with the study of use-alteration characteristics (Chapter 2), and the forms of early Anglo-Saxon pottery (Chapter 3), our understanding of the decorative process can be readily advanced by drawing analogy with ethnographic literature. The following discussion makes use of a broad range of ethnographic studies (which specifically sought to understand pottery decoration) to illuminate the ways in which the decoration on pottery is produced, both with respect to the physical processes of decoration, but also the effect of social relationships on the development and maintenance of decorative styles.

The Analysis of Decoration

A number of authors have hinted at there being patterns in the arrangement and location of designs on the bodies of early Anglo-Saxon pottery, and in differences in the materials used to make stamping tools. It is worth bringing these observations together to form the basis of a discussion of the processes involved in decoration, the choices that the potter made at each stage of the decorative sequence, and how decoration was arranged around the vessel. Richards (1992, 145-6) has drawn attention to the fact that decoration is largely arranged in concentric fields around the vessel body, whilst Hills (1977, 12-3) notes that almost all urns have a continuous band of horizontal lines around the neck. Hills also points out that stamps rarely occur alone; indeed, they appear to have been a means by which to fill panels and motifs, or border and emphasise incised lines. There do, therefore, appear to have been a number of 'rules'

[4] The *chaîne opératoire* is defined as 'the series of operations that transforms a substance from a raw material into a manufactured product' (van der Leeuw 1993, 240).

(or at least dispositions or habits), which influenced how potters decorated their vessels, how they arranged the decoration, and how specific elements were used.

To gain insight into the Anglo-Saxon decorative traditions we must consider when decoration was applied, the order in which it was applied, and with what; this decorative sequence is perhaps best described as the *chaîne opératoire*. A *chaîne opératoire* approach to the study of pottery considers the whole process from the extraction of clay, acquisition and addition of tempering materials, through the forming process, decoration, drying, firing and post-firing treatments (for example see Gosselain 1992; 1998). Although the present study is restricted to the decorative stage, it is possible to consider this individual phase as a *chaîne opératoire* in its own right. As the following examples demonstrate, decorators of pottery divide the decorative process into a series of operations that in effect transform an undecorated vessel into a decorated one; the *chaîne opératoire* of decoration. It will be shown that each of the operations are structured by, and performed within, a culturally acceptable set of sequences and options. The ethnographic studies chosen as a source of analogy have been selected because they specifically sought to understand the factors, both technical and social, that affect the way that decorators of pots apply and structure their designs, the order in which they apply them, the reasons behind design innovation and variation, and the way that decorative traditions are maintained and evolve.

The Structure of Design

As Rice (2005, 264) notes, the seminal paper on the study of the spatial arrangement of decoration on pottery is Friedrich's (1970) ethnographic analysis of paintings on the pots from the Mexican village of San José and as such this paper provides a sound starting point for our analysis of pottery decoration. San José pottery is decorated not by potters but by painters; notably their designs are applied after firing. Painters work together in small groups and as such they are exposed to one another's work. They divide the painting process into two stages; the first involves the division of the vessel's surface into bounded areas, or decorative zones, whilst the second involves filling these zones with designs (Friedrich 1970, 333) (Figure 4.4). Some of the divisions which establish the bounded areas are compulsory, whilst others are optional. The compulsory divisions separate the vessel in to horizontal bands that will contain the painted designs and define the main decorative zone (Figure 4.4 a and b). Optional divisions may include horizontal demarcation, which separates the main decorative zone from the neck and the base (Figure 4.4 c), and vertical division, which splits the main decorative zone into rectangles (Figure 4.4 d). Despite their optional nature these divisions are carried out according to certain constraints. For example, horizontal division is restricted to the shoulder and the area between the base and the main decorative zone (Figure 4.4 c), whilst vertical divisions are confined to the main decorative zone (Figure 4.4d) (Friedrich 1970, 333-4).

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Figure 4.4: The design structure of San José pottery decoration. Painting of the vessel edges (a) is compulsory, as is defining the main decorative zone (b). The vessel may undergo further, optional horizontal division (c) and vertical division (d) (Friedrich 1970, Figure 1).

Once the zones that contain the decoration have been defined by painting, the designs that fill these zones are painted. These designs are organised into two types, termed 'design elements' and 'design configurations'. Elements are the smallest units of design whilst configurations are combinations and arrangements of elements (Figure 4.5). Configurations are not employed haphazardly and there are clear restrictions as to where the painters can apply them. The shape of a configuration may restrict its use to certain locations although, on the other hand, painters may simply conceive that certain configurations should only be used in particular areas. The shapes and size of configurations a, b and c (Figure 4.6), for example, would suggest that all could be used in the same place, yet some are found only in one area of the vessel, whilst others are found in two or three areas (Friedrich 1970, 335).

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Figure 4.5: San Jose design elements and configurations (Friedrich 1970, Figure 2).

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Figure 4.6: The locations in which different configurations are used (hatching indicates that the configuration is used in that area of the vessel (Friedrich 1970, Figure 3).

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Figure 4.7: Design configurations used by eleven different San Jose painters. Shaded squares indicate that a particular painter used that configuration, for example, Painter 1 uses configurations a, e and f, whilst Painter 5 uses b, c, e and f (Friedrich 1970, Figure 4).

Despite the fact that the painters work together in groups, and that they all work within the same limits of the same design structure, not all painters use the same range of elements and configurations (Figure 4.7) and there are significant differences in the way that individual painters execute those that they do share. Consider, for example, the five vessels shown in Figure 4.8; in 4.8a we see that the diagonal lines painted around the vessel's centre are very thin, close together and numerous. In contrast, those on the vessel depicted in Figure 4.8b are much thicker, further apart, are fewer, and they overlap the horizontal lines that define the central zone. Other differences can be seen in the execution of the flowers that circle the vessels. In Figure 4.8b, the petals radiate from a central dot, but in the Figure 4.8c there is no central dot and the petals emerge from a single point. In contrast, the petals in Figure 4.8d are arranged around large central zones which contain six or seven dots, whilst in Figure 4.8e the petals are seen to emerge from a small blank circle. Some of these differences can be accounted for in terms of the tools used − for example, whether thin or thick brushes were used − whilst other variations may relate to the painter's skill or aesthetic preferences (Friedrich 1970, 336-41).

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Figure 4.8: Five vessels painted by different individuals. Differences in execution of design elements and configurations demonstrate individual style (Friedrich 1970, Figures 7-11).

Daniel Miller (1985), in his study of the pottery produced in the village of Dangwara (India), noted that amongst the potters he observed decoration was, like in the San José tradition, conceived as a set of structures, elements and motifs, and it is worth summarising his observations. Dangwara painters use horizontal lines to divide vessels into three *compulsory* decorative zones or 'fields' (Miller 1985, 98). The first field is found immediately below the neck; the second, between the neck and the maximum diameter; and the third, known as the basal field, the area between the maximum diameter and the base (Miller 1985, 98-9). Once defined, these fields are filled with decoration. Decoration takes the form of elements, *pans* (triangle shapes that are used to divide the fields – Figure 4.9) and motifs. Elements are the smallest irreducible painted shape, such as straight or wavy lines, circles, spirals and blobs; they never appear in isolation but are combined and elaborated to produce motifs and *pans* (Miller 1985, 99-101).

Like the elements and configurations of the San José decorators, the Dangwara conceive that certain *pan* and motifs are restricted to given areas of the pot and that the horizontal fields can be divided into optional sections. These divisions are achieved by applying the triangular *pan*. The *pan* splits the horizontal field into panels and these panels are then filled with other motifs. Although this division is optional, the *pan* themselves, and the divisions, are restricted to the area between the neck and the maximum diameter (Figure 4.9). Despite working within the same repertoire of elements and motifs, individual painters may or may not choose to use particular designs or show preferences for certain types, and there are considerable differences in the way that individuals execute the same motifs (Miller 1985, 104, 112, Table12).

Figure 4.9: Dangwara *pan*. *Pan* are restricted to the shoulder field (Miller 1985, Figure 33).

The order in which a Dangwara pot is decorated is also of interest as this aspect of the *chaîne opératoire* establishes the overall design. Like the San José painters, the decorators of the Dangwara pottery apply their designs after vessels have been fired. First a cloth is used to wipe red ochre around the neck and the maximum diameter; in effect this establishes the fields. Painting follows this and the first area to be painted is that between the base and the maximum diameter. Here, a cloth dipped in paint, is used to draw vertical lines, overlapping semicircles, diagonal lines, or V shapes (Miller 1985, 109-10). In the second stage the cloth is discarded and the decorator uses the spine of a date-palm leaf to apply paint. The lines that delimit the neck field are painted first; this is followed by the application of *pan* and/or motifs (Figure 4.10). For the *pan*, the outer limits of the triangle are outlined and these are then filled with wavy and straight lines. The potter may or may not choose to draw each *pan* before they move onto the motifs that alternate with the *pan* (Miller 1985, 108-9).

Figure 4.10: Painting motifs in the shoulder field. In this case the painter has chosen not to apply *pan* in the shoulder field; also note that the neck field and the basal field have already been painted (Miller 1985, Figure. 37).

To summarise, then, in common with the San José case-study presented above, the individual Dangwara decorators decorate their pottery within the limits of a design structure and whilst certain aspects of the structure are optional, the decoration is applied in a specific order. Although they use a range of motifs, certain motifs are restricted to certain zones, and even though decorators are aware of the whole set of motifs they may or may not choose to use them all. Furthermore, individual painters execute particular designs according to personal idiosyncrasies. Observations of such practices are repeated time and time again in the ethnographic literature. Gosselain (1992) noted, for example, that the potters of the Bafia (Cameroon) conceive their decoration as a three-tier system. The first level is compulsory and comprises the establishment of a rouletted zone around the upper part of the vessel body. Next, optional bordering of this zone takes the form of applied clay coils or the incision of horizontal lines (Figure 4.11). Diagonal lines or incisions, appearing singly or as groups, may then be used to form chevrons in this zone (Figure 4.11). Finally, and again optionally, small knobs of clay may be placed at the top of the angled lines (Figure 4.11) (Gosselain 1992, 573).

Figure 4.11: Bafia (Cameroon) pottery (Gosselain 1992, Figure 5).

The first stage in the decoration of water pots produced by the Luo of Kenya involves covering the neck and body with braided grass or roulette impressions. Next, the neck is separated from the rest of the body by a set of reed impressions. The main decorative zone is contained between this band and the maximum diameter. This zone is decorated with horizontal bands and although two are most common, one or three bands do also occur. Bands may be enhanced by scalloping or lobing, or they may contain other detached motifs (Figure 4.12) (Herbich 1987, 196-8; Herbich and Deitler 1991, 124; Deitler and Herbich 1998, 250). Wallart (2008, 185-193) notes that the Dii potters (Cameroon) restrict decoration to given areas of the vessel and that the decoration is applied in a regular, prescribed order, whilst Arthur (2006, 44) describes the types of decoration employed by the Gamo, noting that particular types of ornamentation are restricted to certain vessels and that the individual elements are confined to specific locations on the pot.

Figure 4.12: Luo water pots manufactured and decorated by a single potter community in the Ng'iya market (Herbich 1987, Figure 2).

Tools of the Trade

Having considered the structure of decoration and the order in which it is applied, it is useful to consider the tools involved in the decorative process. In particular, this discussion focuses on how individual potters use different tools to accomplish the same result. This is a particularly salient point for the present study as Anglo-Saxon potters clearly used a range of tools, often made of different materials, to apply their decoration (see below and Briscoe 1981).

The structure of decoration on vessels produced by potters in Bafia village (Cameroon) has already been highlighted but it is worth considering the range of tools that they use, as, their decoration, like that of the early Anglo-Saxons, consists of marks made in the surface of the clay before firing. All Bafia potters apply a band of rouletting on the upper part of the body; this stage is compulsory and forms the base on which all further decoration is applied (Figure 4.11). Rouletting is achieved by rolling a hair curler, a pleated- or knotted-strip roulette, or a twisted-string roulette across the surface of the wet clay; each type of roulette notably produces a different pattern. Whilst some potters use three of these tools, others use just one or two. In the second stage of decoration lines are incised within the rouletted zone and/or bordering it. These incisions are made with the tip of a *Bifid* stick or the point of a calabash scraper although the same result is achieved with either tool. Intriguingly, this is a secondary use of calabash scrapers as they are primarily employed in the forming stage to join the coils of clay and thin the vessel walls (Gosselain 1992, 573; 2000, 196).

Like the Bafia, potters residing in the Luo district of Kenya decorate their vessels with roulettes (Figures 4.12 and 3.6). Whilst those in the Luo village of Usenge (Figure 3.6, vessel 5) use a stripped and dried corn cob, potters in the nearby Luo village of Aram (Figure 3.6, vessel 6) use either a rolled and twisted- or braided-cord roulette made from reeds. Other Luo communities − the Ny'iga, Akala, Tinagre, and Mariso − use roulettes of braided grass or nylon (Figure 3.6, vessels 1-4) (Herbich 1987, 198; Herbich and Dietler 1991, 120). Tool variation is not restricted to the implements used to produce the rouletting. For example, in establishing the band that delimits the neck from the main decorated zone the Ny'iga potters use a split reed shaft, whilst those of the Aram use a twig from the *Euphorbia* bush (Herbich 1987, 198; Herbich and Dietler 1991, 120).

Unsurprisingly, a survey of the ethnographic literature reveals that tool-based variation amongst potters working within the same repertoire of structure and design is a commonly occurring theme. Indeed, Arthur (2006, 45) reports that different Gamo (Ethiopia) potters incise lines with either a sheep's tooth embedded in the end of a stick or two iron prongs protruding from a wooden handle. Potters of the Philippine town of Gubat use cowry shells, metal spoons, or empty glass bottles to decorate their pots with bands of burnished zigzag lines, whilst those residing in the village of Shanti Nagar (Delhi State, India) use either a pointed wooden stick or a piece of metal to apply small incisions along the rims of their pipe bowls (Freed and Freed 1963, 34, 39; London 1991, 193).

The Development of Decoration and the Spread of Ideas

As the above examples demonstrate, individual potting communities appear to be governed by their own traditions, which dictate the way in which they decorate their vessels. We must consider what factors and processes ensure that they are able to maintain the traditions and/or allow them to evolve. As the following demonstrates, the answer to this question is largely found in the socio-political and economic environments in which pottery is produced and the relationships between individuals in these communities. This is a particularly salient point for our study because, as has been discussed, although there is a high level of consistency between the types of decoration seen on urns found in the cremation cemeteries of early Anglo-Saxon England, the way in which these decorative elements are used (for example, upright, reversed, continuous or broken chevrons – see above and Richards 1987), and the frequencies in which they occur, vary on a cemetery by cemetery basis. Furthermore, by the sixth century, a new type of decoration – panel-style stamped decoration – emerged in Anglo-Saxon England that was absent from cemeteries on the continent (Myres 1969, 58). By consulting the ethnographic literature, we can begin to gain an understanding of how this level of consistency was maintained, how these cemetery-based variations developed, and how the later panel-style stamped decoration evolved.

Gosselain (2000, 193) suggests that decoration is a particularly visible and technically malleable stage in the *chaîne opératoire*. This suggestion is certainly supported by the examples discussed above, with potters choosing different tools to decorate vessels, applying optional motifs, dividing decorative areas into compulsory and optional zones and, as the following will demonstrate, developing their designs and incorporating these innovations into the acceptable repertoire. In contrast to the application of decoration, the forming and shaping stages of manufacture are largely resistant to change as they are the product of motor habits and manual automations that were learned during the potter's apprenticeship. Unlike decoration, any changes that are made at the forming stage may jeopardise the entire manufacturing process (Arnold 1989, 181; Gosselain 2000, 193; van der Leeuw 1993, 240; Wallaert 2008 179). In agreement with the observation that forms remain largely static, but that decoration is malleable, numerous ethnographic studies report 'drastic' changes in decoration over relatively short periods of time, even within a single decade, whilst the vessel forms and modes of manufacture remain largely constant (Arnold 1987, 553; 1989, 181; Deitler and Herbich 1998; Gosselain 2000, 171-2; Wallaert 2008, 179, 197).

A key concept to understanding the maintenance and evolution of decorative styles is the environment in which potters learn and practice their craft and the social relationships that exist in this environment, particularly those between the learner, teacher and peer group. Learning is not simply the transition of knowledge from one person to another; rather it involves a level of socialisation and the acquisition of a new element of social identity. Learners are expected to attain a certain level of competence that is determined by the teacher or group; to achieve such a level is to be accepted by the group, to become a member of that group and to share a sense of group identity. In essence, potters are part of, and pottery is produced within, a 'community of practice' – a 'group of practitioners with a shared source of group identity' (Bowser and Patton 2008, 108). Moreover, as Wallaert (2008, 179) notes, learning does not end with the completion of an apprenticeship and, indeed, the communities of practice in which potters operate ensure that learning is a continual process. As will be shown below, the social relationships that exist between individuals in these communities of practice often manifest themselves in the decoration of pottery and influence the learning process.

Returning to the Luo of Kenya we see that potters are female and taught to pot after marriage. Their learning is part of a larger post-marital re-socialisation in which the women are indoctrinated into the husband's way of life. Wives relocate to the husband's homestead and are taught by their mother-in-laws and/or, as they are polygamous, their co-wives. Learning takes the form of watching and imitating the teacher, rules as to what is acceptable are never expressed, and the teacher corrects the learner with phrases such as 'No, that is not right − watch me' (similar modes of learning are reported amongst the Dii potters in Cameroon (Wallaert 2008, 190)). By learning in this way, the women acquire a set of habits and dispositions that appear 'natural' and this ensures that they adopt and perpetuate the local ceramic traditions (Herbich 1987, 201; Herbich and Dietler 2008, 232-4).

Despite the learning process, the Luo's decorative styles do not remain static and, once taught, the potters do not slavishly reproduce them. Indeed, all potters have a slightly varied, if limited, range of decorative motifs which they may choose to share with others in their community. Any innovations that a potter might make are governed by the acceptable bounds of tradition and they are produced using the tools and techniques gained from apprenticeship (Herbich 1987, 201; Deitler and Herbich 1998, 254). As noted above, Luo potters are female and they are taught to pot by their co-wives and mother-in-laws. As tension and competition exists between the co-wives, after learning, the wives may choose to spend considerable time visiting friends in other homesteads and potting with them. These interactions expose the women to the works of other potters and in particular other potter's personal variations in design. On the one hand this helps to maintain and encourage an 'overall intra-community homogeneity' and 'consistent range of variation' but it also facilitates the development and spread of new ideas and designs (Herbich 1987, 201).

Intriguingly, the introduction, development, and subsequent adoption of new designs are largely the result of the social relationships that exist within the groups. For example, Herbich observed that the innovations of one particular potter were adopted by others in the community because of her 'personal popularity' and willingness to help others improve their potting skills. On the other hand, a second potter tried persistently to maintain a personal decorative technique but this was never adopted by her co-wives as she was considered to be unpopular and a 'complainer' (Herbich 1987, 201-2). One community of potters split into two factions after an argument. Although they had originally made a range of identical pots, after the dispute one group made minor but consistent changes to the way that they decorated their vessels (Herbich 1987, 195-202). What these examples demonstrate is that although the potters produce decoration within an overall Luo repertoire, the 'micro-styles' (different local conceptual traditions – see Chapter 3) that are produced by individual communities are heavily influenced by the social relationships and tensions that exist between potters in that community (Herbich 1987, 201-2). Hypothetically speaking, we might consider, then, that in the early Anglo-Saxon period, particular motifs such as standing arches or chevrons may have been be adopted and reproduced by individual potters for no other reason than that they had been exposed to, and liked the work of, or had a good relationship with, another potter who used such motifs.

Dietler and Herbich are not alone in observing that social relationships influence the decoration of pottery. Indeed, DeBeor (1990, 103) demonstrates that social relations between Shipibo Conibo (Mexico) potters manifest themselves in the decoration of their pots. Whilst Bowser and Patton (2008, 106) report that the decorative styles produced by potters living in Conambo village, in the Ecuadorian Amazon, may be understood as 'part of their motivated political strategies and the active process of constructing, maintaining, and negotiating of social identity, group membership and group boundaries'. The Conambo are an egalitarian society, and although individuals may be considered to be of higher status, no particular person is given charge of village politics or community enterprises. Decisions are made when the community reaches consensus through a process of 'painstaking visiting and discussion among adults of different households' (Bowser 2000, 224-5). Potting is a female activity and the pots are made for household consumption only; girls begin to learn the craft as children with the majority being taught by their mothers. Unlike the Luo, the Conambo potters operate within a matrilineal society, with most post-marital residence being matrilocal. The community of practice includes potters of all ages and skill, from the young learning to pot, through the newly married, to the middle-aged and the elderly (Bowser and Patton 2008, 105-12).

Among the Conambo, the women's work is very personal to them, with decorations being conceived from dreams and seen as a link with the spirit world (Bowser 2000, 228). They strive to produce high quality, beautifully painted *chica* (beer) drinking bowls as these as viewed as a 'valued signifier of a woman's social personhood' and contribute to her 'respect within the community' (Bowser 2000, 227; Bowser and Patton 2008, 108-10). Whilst the decorative styles of individual potters closely resemble those produced by their matrilineal kin there are differences within the work produced by individuals and these are seen to correlate with their life stages and political allegiances. For example, in middle-age the potters may move out from their parents and establish their own homes. At the same time they expand their social networks, actively participating in the community's political systems, and accordingly their status within the community increases. As *chica* bowls are used to drink beer at socio-political gatherings in the home, the women are frequently exposed to the designs of their peers. Consequently, middle-aged potters expand their decorative repertoires and incorporate stylistic influences from women of their own generation who are becoming their allies (Bowser 2000, 231; Bowser and Patton 2008, 112-21).

Older women are not involved in these socio-political endeavours, even though they are perceived as being of the highest status. They have already passed through the socio-political process and as a result their work resembles that of their own generation – that is those women who were their ‘allies’ at the time that they had influence over social politics (Bowser and Patton 2008, 112-19). Older women are considered to be the most accomplished potters and painters and as such other potters pay particular attention to their designs. In particular the younger potters, who are not yet active participants in socio-political activities, see the skill and elevated status of older practitioners and in an attempt to improve their own potting skills draw influence from their designs. Their work is readily identifiable as belonging to that of the kin group but their pots show a greater similarity with those of the older generation than they do with those of the middle-aged (Bowser and Patton 2008, 127). One might be surprised to find that age influences the decoration of pottery, but similar patterns of age-related variability have been noted amongst the Kalinga (Phillipines) (Longacre 1981, 63).

From these examples we can see that innovation, and the evolution and maintenance of design traditions can be heavily influenced by the social relationships between and within groups. It would be foolish, however, to suggest that this is the only factor that affects design. Indeed, as Eerkens and Lipo (2008) demonstrate, changes may be in part due to the introduction, accumulation, and reproduction of random errors over generations. Furthermore, errors are introduced and styles may evolve when decorators attempt to copy the designs of communities operating outside of their own traditions. Indeed, Gosselain (2008, 171-2) identified such a situation amongst the work of the Zarmagande potters (south-western Niger). Zarmagande potters considered the decoration on jars produced by the Zarma-speaking Bella to be ‘prettier’ than their own and as such they attempted to copy them. However, there were considerable errors in their organisation of design structure and the painted designs were not as expertly or boldly executed (Gosselain 2008, 171-2). Such errors are, as Gosselain (2008, 172) notes, ‘inherent in the context that the borrowing took place: potters are imitating a style by observation alone, rather than through apprenticeship and guidance regarding the tools and techniques used, and must devise their own solutions by drawing on their personal stock of technical knowledge’.

The Zarmagenda example introduces to the discussion another element that influences innovation. Both the Bella and the Zarmagenda produce pottery to sell at the local markets and as the Bella pots sell better there is an economic impetus for the adoption of the Bella style and customers actively encourage the Zarmegenda to produce Bella-styled pottery (Gosselain 2008, 172). It seems unlikely that economic concerns influenced ceramic style in early Anglo-Saxon England; indeed, as was discussed at length in Chapter 1, pottery in the early Anglo-Saxon period appears to have been produced on an *ad hoc* basis by individual household for their own consumption. Clearly, then, pottery traditions are, as Gosselain (2000, 190) suggests, 'sociotechnical aggregates', being a 'complex blend of inventions, borrowed elements, and manipulations that display an amazing propensity for redefinition by individuals and local groups'. By considering structure, the use of tools and factors that influence the evolution of designs we can now move forward to consider the decoration of early Anglo-Saxon pottery and the context in which it was produced.

The Structure of Decoration on Anglo-Saxon Pottery

Upon opening virtually any published cremation cemetery report, a reader is likely to be faced with an apparently bewildering array of designs on the cremation urns. On closer inspection, however, we can begin to see that urn decoration was extremely structured and consisted of a limited number of elements. Broadly speaking these elements can be divided into three groups: linear incised decoration; stamped decoration; and plastic decoration (Hills 1977, 32-3; Mainman 2009, 595; Richards 1987, 65-8). As will be demonstrated here, there were clear 'rules' determining how these elements were used and the order in which they were applied. To begin to understand these 'rules' we must first examine the structure of urn decoration. In setting out the catalogue of urns from Spong Hill, Hills (1977, 32-3) outlined a number of observations about how the designs on cremation urns are organised, although she did not pursue this in any great detail. The observations seem to suggest that the Anglo-Saxons were not just applying decoration in a haphazard fashion, but that they held clear perceptions about how this decoration should be organised and structured. Hill's observations form the basis of the following discussion.

The simplest form of urn decoration is that of 'faint narrow incised lines' and 'broad shallow gouged grooves' around the neck of the vessel (Hills 1977, 32-3). These grooves or lines may occur alone or, more generally, in conjunction with other decorative elements, such as vertical and diagonal lines, chevrons, and standing and hanging arches. These other elements are typically arranged in a single line around the vessel, but it is not uncommon to find a double band. Plastic decoration, formed by the application of clay, takes the form of ridges and bosses of various shapes. Narrow ridges, forming cordons, are often located around the neck, and these may be plain or slashed. Furthermore, ridges are often seen to be formed into arches or ring shapes, which, like the cordons, may be slashed or plain. Bosses, on the other hand, are often organised into a single band around the body. They may be round, vertical-elongate, horizontal-elongate, plain or decorated, closely spaced, or arranged so that they define panels. The final form of plastic decoration is a band of faceting, usually found on the carination of pots (Hills 1977, 32). Impressed decoration, or stamping, is the final mode of ornamentation. As Hills (1977, 32-3) notes, stamps are nearly always found in association with linear motifs, forming panels between chevrons and bosses, or accompanying the horizontal lines around the neck; rarely are they found in isolation.

From Hills's comments, then, we can see that the Anglo-Saxon potters had a clear concept of how decoration should be applied and arranged, and how individual elements within the design were to be used. Her observations reveal that the potters largely produced designs accord to two closely related structures, which we will term here Structure 1 and Structure 2; these are schematised in Figure 4.13. Both Structure 1 and Structure 2 comprise three zones which we will term the Horizontal Zone, the Main Motif Zone, and the Basal Zone. The Horizontal Zone takes the form of a band of horizontal lines around the neck. Whilst stamps or further incised decoration may be placed between the horizontal lines, it is the consistent use of a band of horizontal lines around the neck which defines this zone. The Main Motif Zone is the area in which large motifs are placed and the zone in which most of the decoration occurs. The Main Motif Zone is located below the Horizontal Zone and it extends down the vessel body. If decorated according to Structure 1, then the Main Motif Zone comprises just a single band of motifs arranged around the vessel body. If decorated according to Structure 2, the Main Motif Zone comprises a double band of motifs. Finally, we have the Basal Zone; this rarely decorated zone is located on the base of the vessel. Like the ethnographic examples discussed above, we see that early Anglo-Saxon potters had clear ideas about how decoration should be arranged around the vessel. Each of the highlighted zones will now be discussed.

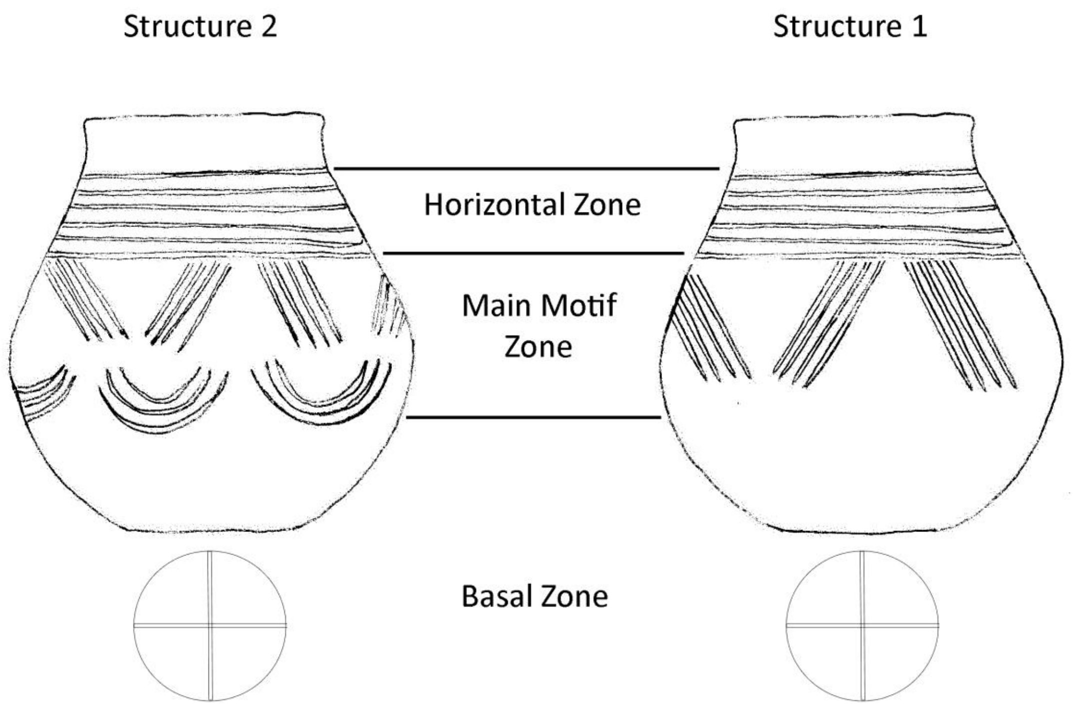

Figure 4.13: The structure of early Anglo-Saxon pottery decoration.

The Horizontal Zone

The Horizontal Zone comprises a band of horizontal lines around the neck (Figure 4.13). It is the simplest mode of ornamentation and with few exceptions all decorated vessels possess it. Indeed, only six (1%) of the decorated urns from Cleatham and two (0.7%) of the decorated urns from Elsham do not have at least a single line around their necks. If we draw analogies from the ethnographic examples presented above, then, we might suggest that this pattern is likely to have been the result of potters being taught in such a way that horizontal lines were viewed as compulsory and that it was 'un-natural' to produce a decorated vessel without them.

Despite the simplicity of this ornament there were options open to the potter regarding how they applied it. Their first choice was in the number of lines to apply; whilst most potters applied three or four, the numbers range from just one to as many as twelve (for example, Myres 1977, Fig. 90, Urn 2829). Richards compared the number of lines around the necks of urns attributed to individual stamp groups, and thus individual potters, at Elsham and Spong Hill, and established that there was less variation within stamp groups than between them (Richards 1987, 174). It would appear, therefore, that the number of lines that a potter placed around a vessel's neck was a product of their personal choice and habits. Again this accords with the ethnographic examples, which demonstrate that different potters display personalised nuances in the execution of the same designs.

As well as the number of lines to place around the neck, the Anglo-Saxon potter had options in terms of line thickness; they may have used only thick or thin grooves or they may have combined both. If the potter chose to use both, then we see that they used the thinner lines to border the thicker lines, thus producing an effect similar to that in Figure 4.14. Although the horizontal lines that were placed in this Horizontal Zone seem to have been compulsory, potters rarely employed them as the single mode of decoration. In fact, such minimalism, classified as Leahy's Group 02a (urns decorated with a band of horizontal lines stamps around the neck, see Chapter 1), accounts for only 3.6% and 2.0% of the decorated pots from Cleatham and Elsham, respectively (Table 4.1).

Figure 4.14: Urn EL75AF from Elsham. Note that thicker lines are bordered by the thinner lines in both the Horizontal Zone and the Main Motif Zone.

Frequently, the Horizontal Zone was elaborated by extending it down the body, allowing the potter to establish multiple bands of horizontal lines, and filling the spaces between them with stamps, plastic decoration, and/or incised motifs. By studying stamp groups Richards (1987, 174) demonstrated that the number of lines per band and the number of bands produced appears to have been the product of the potter's personal preferences and habits. If the Horizontal Zone was elaborated, then, broadly speaking, the potters used the same repertoire of motifs as used in the Main Motif Zone; for example, standing and hanging arches, chevrons, and slashed lines. Notably, however, when placed in the Horizontal Zone, these motifs were miniaturised so that they were able to fit between the horizontal lines that define the Horizontal Zone (Figure 4.15).

Figure 4.15: Urn EL75EG from Elsham. Miniature chevrons have been placed between the lines that make up the Horizontal Zone.

The Main Motif Zone

Early Anglo-Saxon potters rarely chose to decorate only the Horizontal Zone. This is demonstrated by the fact that most decorated urns possess a band of motifs in the Main Motif Zone. Indeed, 87.9% of Cleatham's and 91.5% of Elsham's decorated urns contain some form of embellishment in the Main Motif Zone. As the decoration in the Main Motif Zone is often the most visibly striking element of an urn's decoration, it has been used by many authors as the main variable by which to classify decorated pottery. For example, when Myres (1977) classified urns as being decorated with *stehende Bogen*, *hangende Bogen* (standing and hanging arches, respectively) or chevrons, he was referring to the fact that these *Bogen* and chevron motifs were the dominant form of decoration on individual urns – these motifs are located in what is termed here the Main Motif Zone. Although Leahy's method of decorative classification also uses the motifs that dominate the decorative scheme (see Chapter 1), again the motifs are predominantly found in the Main Motif Zone (Figure 4.16).

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Figure 4.16: Cleatham urn 0194. The decoration on this urn is characterised by the standing arches that dominate the Main Motif Zone. Leahy Classifies this urn as 12a – an urn decorated with standing arches (Leahy 2007a, Figure 52).

In decorating this Main Motif Zone, the potters followed one of two structures (Figure 4.13). If following Structure 1, then they applied a single band of motifs around the body – for example, the decoration seen on Cleatham urns 0172 and 0807 (Figure 4.13 and 4.17) – but if following Structure 2, then they placed a double band of motifs in the Main Motif Zone, for example Cleatham urns 349 and 404 (Figure 4.18). The types of motifs that the potters placed in this Main Motif Zone further affected the internal structure of the zone. If decorating their urns with vertically incised lines, or large vertical bosses, then the potters either placed the bosses and lines at equal distances around the vessel, effectively dividing the Main Motif Zone in to panels, or arranged the lines and bosses into a continuous band around the body (Figure 4.19). If they positioned the bosses and lines so as to form panels, then these panels were often decorated with motifs such as chevrons, arches, stamps, and curvilinear designs (Figure 4.19).

It was not a requirement that the potters formed panels with bosses and vertical lines. Frequently, they used chevrons, arches, or curvilinear designs to produce a continuous band of motifs around the body of the vessel (Figure 4.20). If potters chose to employ bosses alongside a continuous band of motifs, then in this instance the bosses take on a different function from the one they served previously. Indeed, in this case the bosses are generally smaller, of a different shape, placed within and between the motifs (Figure 4.21), or they actually become the motifs themselves, for example, in the form of bossed standing arches (Figure 4.22). This is exactly what we see ethnographically, with potters dividing the vessels into decorative zones, placing motifs in these zones, and having options open to them in how they structure and divide up these zones. Intriguingly, Richards (1992, 146) suggested that cremation urns were designed to be viewed from above and the different internal structures of the Main Motif Zones produces very different results when viewed in this way (Figure 4.23).

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Figure 4.17: Cleatham urns decorated according to Structure 1 – a single band of Motifs in the Main Motif Zone.

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Figure 4.18: Cleatham urns decorated according to Structure 2 – a double band of motifs in the Main Motif Zone.

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Figure 4.19: The structure of the Main Motif Zone. Vertical lines and bosses used to create panels – Cleatham urns 388 and 957. Vertical lines and bosses arranged in a continuous band around the vessel's body – Cleatham urns 759, 944 and Elsham urn EL76PQ.

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Figure 4.20: Continuous bands of motifs in the Main Motif Zone – urn 52, chevrons; urn 788, hanging arches (Leahy's groups 10a and 11s, respectively) (images from Leahy 2007c).

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Figure 4.21: Oval and round bosses between and inside motifs in the Main Motif Zone – Cleatham urns 237 and 708.

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Figure 4.22: Bosses forming motifs in the Main Motif Zone. In this case the bosses have been used to form standing arches.

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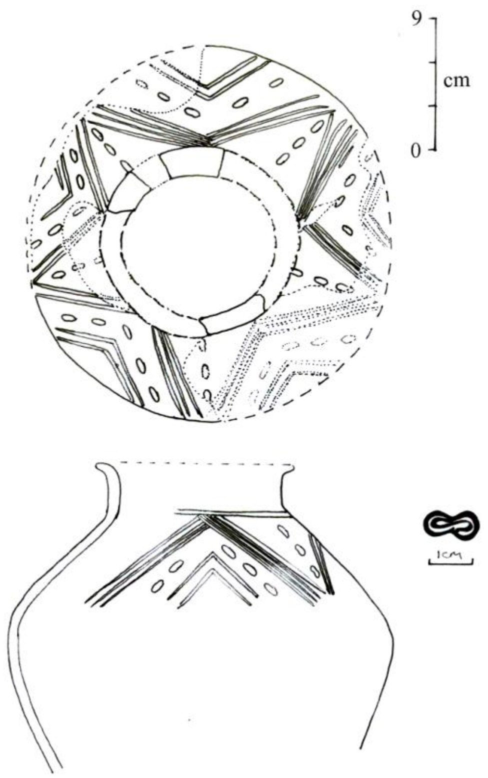

Figure 4.23: Decoration viewed from above. Spong Hill urn 3126 (left) (Hills *et al.* 1994 Figure 74), South Elkington urn 151 (illustration by the author).

There were a considerable number of possibilities open to the potter in how they executed the motifs used to decorate the Main Motif Zone. If drawing chevrons, for example, the potter had to decide how many to apply, how to space them around the body, whether they would be upright, reversed, continuous, or broken, and how many lines to use in drawing each motif. In terms of the number of chevrons, this decision was probably dependant on the size of the vessel, whilst the number of lines appears to be related to 'more localised factors of manufacture' and the 'identity of the potter' (Richards 1987, 171-4). Indeed, like the number of lines that the potters drew when decorating the Horizontal Zone, Richards reveals that there is less variation between the number of lines per chevron within stamp groups, and thus individual potters, than between them (Richards 1987, 174). The same must be said of the choice of whether to use continuous, broken, upright or reversed chevrons. Indeed, in his attempts to correlate grave goods with incised designs, Richards (1987, 172-4) noted that whilst some motifs were correlated with certain grave goods, neither the number of those motifs, whether they were upright, reversed, continuous or broken, nor the number of lines used, appears to be important; rather it was the use of the motif itself that was significant. This is exactly what we saw in the ethnographic case studies, with potters applying the same motifs but executing them according to personal nuances.

An important point to note is that however the potters chose to decorate their urns they did not slavishly reproduce the same designs. This can be demonstrated by considering urns identified as belonging to particular stamp groups. The potter responsible for Spong Hill urns 1364 and 1366 (Figure 4.24), for example, is seen to use exactly the same three stamps, order their designs in the Main Motif Zone according to Structure 1, and produce vessels of the same form (according to the typology of form devised in Chapter 3 these would be classified as 1Aii). In the Horizontal Zone of both urns, the potter has established two separate bands of incised lines; the first consisting of four lines, the second of three lines. On urn 1364 the potter has placed stamps between these bands, but on 1366 rather than stamps between the bands they have placed a slashed cordon. On both urns the potter has divided the Main Motif Zone into panels; this was done by placing equally spaced vertical bosses around the body. On 1366 the potter has positioned bossed standing arches in these panels but on 1364 the panels are filled with incised crosses.

The same situation, with individual potters varying their designs, can be seen by considering urns from Elsham. Here, two vessels that were buried next to one another (EL75KVa and EL75KVb) were decorated with the same stamp, made of the same ceramic fabric, and were apparently of the same form. However, the potter responsible for these urns chose to use different motifs when decorating the Main Motif Zone of these urns. The Main Motif Zone of 5KVa is decorated with stamp-filled panels whilst the Main Motif Zone of 5KVb is decorated with stamp-filled hanging arches (Figure

4.24). At Cleatham, the potter apparently responsible for the three urns that Leahy identified as belonging to Stamp Group 3(Urns 0693, 0284 and 0492) decorated their urns by placing a continuous band of one-line chevrons in the Horizontal Zone. The Main Motif Zone of urns 0284 and 0492 is decorated with two- to four-line hanging arches, whilst on 0693 the Main Motif Zone is decorated with one-line chevrons (Figure 4.25).

Figure 4.24: Spong Hill urns attributed to Spong Hill Stamp Group 8 (left) (Hills 1977, Figure 67). Two Elsham urns buried in next to one another (EL75KVa, top right, and EL75KVb, bottom right), made of the same fabric and decorated with the same stamp.

Although these examples demonstrate that the potters made choices from an available repertoire, it also reveals that they did not select the motifs on an ad-hoc basis. In Cleatham Stamp Group 3, for example, we see the potter used either hanging arches or chevrons in the Main Motif Zone, despite the fact that they were probably aware of grouped vertical lines or standing arches. Similarly, the so-called Illington/Lackford potter (see Chapter 1) either decorated the Main Motif Zone with hanging arches, pendant triangles, or else they left it blank and only decorated the Horizontal Zone (Figure 1.12) (Davison *et al.* 1993). This is exactly the situation demonstrated in the ethnographic examples, with potters being aware of a range of motifs but choosing instead to make use of a select group and then varying their designs according to their personal stock.

Figure 4.25: Cleatham urns belonging to Leahy's Stamp Group 3.

The Basal Zone

Decoration of the Basal Zone – the base of the urn – was clearly optional, with few potters choosing to decorate it. Only eight of the pots from Cleatham were identified as having decorated bases and a similarly small assemblage was recovered from Elsham (just four examples). This is consistent with the observation made by Richards (1987, 94) that in a sample of 1170 urns from ten cemeteries only eight (0.3%) had decoration on their bases. All of the Cleatham urns with decorated bases were decorated with a cross (one of these also included stamps), as was one of the Elsham urns. Of the remaining three Elsham vessels, two had cross-hatched bases, whilst the final vessel is, for want of a better term, exceptional; its base is shaped into a square and slashed cordons have been placed around the basal angle (Figure 4.26). It has not been possible to find any other vessel that remotely compares to this example.

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Figure 4.26: Decorated bases on Elsham urns EL75EO (top), EL7 6CF (middle), and EL6EK (bottom).

Although decorated bases are a rare occurrence, we can see patterns in the types of motifs used in the Basal Zone. We have already noted that the cross motif was the most commonly employed motif on the bases of urns from Cleatham, and a survey of published cemetery reports reveals the cross was the most commonly used form of basal decoration at other cemeteries: for example, at Mucking only four pots were identified as having decoration on their bases and all were crosses (Hirst and Clark 2009, 595), whilst the author has counted seventeen crosses on the bases of urns illustrated in the Spong Hill publications. Two of these take the form of two-line crosses enclosed within two-line squares (urn 2153, Hills *et al.* 1981, Figure 42; urn 2708, Hills *et al.* 1987, Figure 62); one had a two-line cross within a circle (urn 2360c, Hills *et al*. 1987, Figure 20); two had two-line crosses (urns 2145 and 3150, Hills and Penn 1981, Fig. 80; Hills *et al*. 1987, Figure 47); and the remaining twelve were single-line crosses (urns 2124 Figure 100, Hills and Penn 1981; urns 2678 Figure 43, 2681 Fig. 44, 2796 Figure 49, 2733 Figure 55, 2299a Figure 63, 2463 Figure 69, 2690 Figure 77, Hills *et al*. 1987; urns 3057 Figure 42, 3121 and 3125 Figure 45, 3206 Fig 49 Hills *et al*. 1994). Wilson (1992, 143) has tentatively identified crosses on the bases of cremation urns as representations of swastikas. The present author remains sceptical of this interpretation as clear swastikas have been identified on the bases of two urns at Spong Hill (Hills 1977, Fig 78 urn 1426; Hills *et al.* 1987, Fig 35 urn 2562). Thus, although decorated bases are rare, the motifs employed are consistent across the cemeteries; this demonstrates that potters had a clear understanding of the types of motifs that were appropriate for use in the Basal Zone.

The Order of Decoration and the Tools Employed

As we shall see in the following discussion, the first stage in the pottery decorating process was the application of incised lines. Before we consider the process of decoration in detail we must first ask at what point in the manufacturing process were these incised lines applied? For example, were they made immediately after forming, when the clay was wet, did the potter wait until the clay had dried to a leather-hard state[5], or were the lines applied when the clay was bone dry, just before firing? Consideration of the condition and morphology of the edges of these lines answers this question. Grooves and incisions made on clay in a leather-hard state have smooth, even margins. If the clay is too dry (i.e. it is bone dry) when the lines are drawn, then the

[5] The leather hard stage of drying is the point at which the clay is no longer plastic; it is rigid and can be safely handled (Rice 2005, 65).

incising tool causes the surface of the clay to fracture away, leaving the lines with chipped edges. If the clay is too wet when the lines are drawn then the borders of incisions are elevated and rough and attempts to smooth them out often result in a loss definition and/or complete obliteration of the line (Rye 1981, 90). Looking at urns from a number of cemeteries (for example, Spong Hill, Cleatham, Elsham and Mucking) we can see that the lines drawn in the surface of the clay possess smooth even edges, thus we can conclude that, generally speaking, early Anglo-Saxon potters left the clay to dry to a leather-hard state before decorating their urns (Figures 4.27 to 4.29).

Figure 4.27: The condition of incised lines on cremation urns. The smooth, even profile of the lines demonstrates that they were made when the clay was in a leather-hard state. Spong Hill urns 2548 (top left) and 2436 (bottom left) (Hills *et al.* 12987, Plate V). Mucking urns 334 (top right) and 816 (bottom right) (Hirst and Clark 2007, Figures 334 and 335).

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Figure 4.28: The condition of incised lines on Cleatham urns 738 (top) and 1004 (bottom). The smooth, even profile of the lines demonstrates that they were made when the clay was in a leather-hard state. Note that on urn 1004 the chevrons were drawn after the horizontal lines; this is demonstrated by the fact that the grooves of the chevrons impact upon and cut through the horizontal lines. Note also that, by looking at the overlaying of chevron lines, we can see that the potter rotated the urn in a clockwise direction as they decorated it.

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Figure 4.29: The condition of incised lines on cremation urns. The smooth, even profile of the lines demonstrates that they were made when the clay was in a leather-hard state. Elsham urns EL76NEb – a Daisy Grid Potter urn (top) – and EL76OT - a Sancton/Baston style urn (bottom).

With an insight into the stage of the manufacturing process at which early Anglo-Saxon pottery was decorated, we must now ask what tools the potters might have used to draw the lines that decorate their vessels. Unfortunately, unlike stamps, we do not have any direct evidence of the materials and tools used. However, by looking at the morphology of these grooves we can make inferences about the types of tools that were employed. In the first instance we can see that the incisions were not made with sharp objects, such as the point or blade of a knife. If this were the case it would not have been possible to achieve the smooth, shallow, rounded profiles characteristic of these lines (see Figures 4.27 to 4.29). Secondly, as we see lines of little more than a millimetre wide through to those of almost a centimetre (Figures 4.13 and 4.27 to 4.29) we know that that potters made use of tools with a range of point diameters. To this we can add that some potters used the same tool to produce all the lines on a single vessel, whilst others used tools interchangeably – for example, the potters who decorated Elsham urn EL75AF and Mucking urn 816 alternated between thick- and thin-nibbed tools (Figures 4.13 and 4.27). The thickest lines might have been produced by drawing the back of a fingernail across the surface of the clay (the author has successfully used this technique experimentally), a glass bead, the epiphysis of a small animal or a shaped stick or bone. For the thinner lines we might consider that the potter used the tip of a shaped stick, piece of bone, the tip of a deer tine (carved bone and tines are known to have been used as stamp dies, see below), the tip of a pin-beater, or a metal object with a rounded end, perhaps similar to that of the recently discovered copper-alloy pot stamp from Norfolk (Figure 4.32) (Naylor and Geake 2011, 292, Figure 3, f). Either way, by looking the shapes and contours of incised lines we can tell that early Anglo-Saxon potters applied decoration when the clay had reached a leather-hard state, and that like the potters in the ethnographic examples discussed above, they had a range of tools available to them.

By looking at the points of intersection between the horizontal lines that define the decoration in the Horizontal and Main Motif Zones, and the motifs that fill the spaces within them, we can begin to make inferences about the order in which different aspects of decoration were applied; it is best to do this on an urn by urn basis. For example, we can tell that the potter who decorated Cleatham urn 1004 (Figure 4.28) applied the horizontal bands that define the Horizontal Zone before they applied the chevron motifs that filled this zone. This is demonstrated by the fact that the individual lines of the chevrons impinge upon and cut through the horizontal lines that delimit the

Horizontal Zone. Furthermore, by considering the how the chevrons overlap one another we can see that the potter moved from left to right, rotating the pot clockwise as they decorated. We see a similar situation on Cleatham urns 0029 and 0922 where the potters defined the horizontal lines before drawing the vertical and diagonal lines and chevrons (Figure 4.30).

Figure 4.30: Cleatham urns 29 and 922. Note that the horizontal lines were drawn before the vertical and angled lines and chevrons (figures from Leahy 2007c).

Finally, in this consideration of how, when and with what the decoration was applied to cremation urns we must consider stamps and stamping tools. As noted by Hills (1977, 32), stamps are nearly always found in association with incised lines. We can also add that although stamps occur frequently in the Horizontal Zone and Main Motif Zone they are hardly ever found on the bases of cremation urns (the present author knows of only one example of stamps on the base of an urn – Cleatham urn 0332 (Leahy 2007c)). The association of stamps with incised lines appears to give stamps specific functions within the design structure; they are either used to border and punctuate, or fill the spaces between and within incised motifs (Figures 4.17 to 4.25, and 4.27 to 4.29). As is the case with the ethnographic examples, then, we see that the potters had a clear concept of how these design elements should be employed and the locations in which their use was appropriate. That stamps should be used alongside incised lines is demonstrated by the fact that only seven out of 372 stamped Cleatham urns (313, 405, 428, 679, 1032, 1067, 1108) did not possess any incised lines on them and just two out of 162 stamped urns from Elsham (EL76MPb and El76NW).

We have seen that, by considering the way that incised lines overlap one another, we can determine the order in which the lines were applied. However, as stamps and incised lines rarely encroach on each other it is much more difficult to identify the order in which they were applied. Fortunately, there are a few rare instances where this is possible. For example, if we consider the lines and stamps on Spong Hill Urn 1757 (Figure 4.31) we can see that the stamps encroach on the lines; clearly the stamps were applied after the lines had been drawn. The same is true of Spong Hill urn 2443 (Figure 4.31); here the bottom left corner of a square shaped stamp can be seen to overlay the incised lines of a chevron motif. A circular stamp placed in the hanging arch of a vessel attributed to the Illington/Lackford potter impinges upon a horizontal line, clearly demonstrating that the stamps inside the arches were applied after the Horizontal Zone had been defined by incised lines (Figure 4.31). It would seem, then, that the application of stamps was the final stage in the decoration of Anglo-Saxon pottery.

By combining the different strands of evidence presented above we can suggest the following overall order of application of decoration: i) plastic decoration, such as bosses and cordons, were produced at the forming stage whilst the clay was wet; ii) once the pot had been formed and the clay had dried to a leather-hard state, the decorative zones (Horizontal, Main Motif and Basal Zones) were defined by the incision of lines; iii) incised motifs, such as standing arches and chevrons were then drawn in the decorative zones; finally iv) stamps were applied. This is interesting in the respect that it tells us that the potter, after drawing out all of their lines, had an option whether to stamp or not. Thus, if a potter chose to apply stamps to some pots but not others, one must question whether we would be able to identify the unstamped vessels as the product of the same person; it will be shown below that we can at least identify some of them.

Briscoe (1981, 22-3) has already discussed the range of stamping tools that have been recovered through excavation and these, like the ethnographic examples discussed above, reveal that the potters had options open to them in terms of tool material. For example, she reports that stamps made from the antler tines of red deer have been recovered from West Stow (Figure 4.32), whilst stamps made of bone have been identified at Lackford. To this we can add evidence for pots stamped with horse teeth (Lethbridge 1951, Figure 27) and the teeth of bone combs (Briscoe 1981, 26), the recently discovered copper-alloy stamp from Norfolk (Naylor and Geake 2011, 292,

Figure 3, f) (Figure 4.32), and the numerous brooch and jewellery stamps recognised on pottery throughout eastern England (Briscoe 1985, 137-42). There were probably also tools that may have been made of wood, feather quills, or other organic materials, but due to their perishable nature they have not survived in the archaeological record (Briscoe 1981, 23-6). It is interesting to note that the small number of stamping tools that have been found actually come from a very limited area, being found mainly in East Anglia (Briscoe 1981, 22-3). This distribution may simply be due to levels of archaeological preservation or intervention, but, equally, it does raise the possibility of regional preferences for stamping-tool material.

Figure 4.31: Stamping was undertaken after incised lines were drawn. The 'V' shaped stamps used on Spong Hill urns 1757 (top left) have begun to overlap and erase a vertically incised line (Hills and Penn 1981, Plate IVa). The circular stamps used on an urn attributed to the Illington/Lackford potter are encroaching upon the horizontal lines of the Horizontal Zone (top right) (Myres 1969, Plate 8). A square shaped stamp erases part of two diagonally incised (chevron) lines on Spong Hill urn 2443 (bottom – bottom right of image) (Hills *et al.* 1987, Plate IIIa).

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Figure 4.32: Pottery stamping tools. A carved antler stamp from West Stow (top) (Myres 1969, Plate 8) and a copper alloy stamp from Norfolk (Naylor and Geake 2011, Figure 3).

As well as stamp-tool material choice, the potter had a plethora of stamp designs open to them – in her catalogue of stamps Briscoe (1981) identifies well over 120 individual types – and it appears that, like the incised motifs, the potters selected a small number of these stamp-types to decorate their pottery. This deduction is supported by considering individual stamp groups. If we look at Cleatham, for example, Stamp Group 6 is identified by one particular stamp type – Briscoe's Category B, a cross shape (Leahy's Cd*, a double-lined cross) (Figure 4.33). Although the potter/workshop responsible for this group of urns preferred to use cross-shaped stamps, the fact that each of the stamps impressions is different tells us that each stamp represents a different stamping tool and that the potter was willing to vary the overall design of the cross-shape. The cross-shaped stamps in this group are often accompanied by other stamps and if one considers the forms of these additional stamps we see that they too are variations on a general theme – four of the seven accompanying stamps are ring shaped. Perhaps then, like the incised motifs, these stamps represent a potter, working within a very personal repertoire, producing and using different versions of the same stamped symbol on different manufacturing occasions.

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Figure 4.33: Stamps found on urns attributed to individual stamp groups. Stamp Group 6 from Cleatham is characterised by cross shapes, but few of these cross shapes are of the same form (above, Leahy 2007a Figure 39). Stamps used on Illington/Lackford urns from Illington (Davison *et al*. 1993, Table 5). Note that whilst there are 29 different stamps there are only eight types: nine are circles with crosses in the middle, five are simply crosses, two are rings, three triangles, three S-shapes, five cross-hatched circles, one cross-hatched square and one U-shape.

The consistent range of variation in the use of particular stamp-types by individual potters is a phenomenon that is replicated throughout the cemeteries of Anglo-Saxon England (see Spong Hill for a plethora of examples, in particular Stamp Groups 4, 5, 7, 11,18, and 20, Hills 1977; Hills *et al.* 1981) and perhaps the best example of this is seen in the stamps found on vessels attributed to the Illintgon/Lackford potter. At Illington 40 pots are credited to this potter. Whilst Davison *et al.* (1993, 94-5) identify 29 different stamps on these 40 urns, when one considers the stamps as general types we see that the potter utilised a very small repertoire of motifs; in fact, just eight (Figure 4.33). When decorating their pottery, the potter selected just two or three of the eight stamp-types, with their most common choice being the cross-shaped stamp and/or a circular stamp with a central cross (Davison *et al.*1993, Table 5). These observations accord with Richards's (1987, 184) suggestion that 'the general shape or design [of the stamp] is more important than the specific motif'. That is to say that, for example, that Briscoe's types A1b, Alc, A2a, A2b, A2c and A2d (Figure 4.34) should be considered together as a single type of design – circle(s) with (or without) a dot in the middle, rather than six separate types.

Figure 4.34: Examples of Briscoe's stamp classification system (Briscoe 1981).

Summary

In common with the ethnographic examples discussed above, we can see that the potters of Anglo-Saxon England perceived that the decoration on vessels should take place according to accepted norms. Given the consistency of structure, decorative motifs and stamps employed across the country it seems likely that potters were aware of the full repertoire of incised motifs but, rather than make use of all available designs, they apparently limited themselves to a relatively small personal stock. Furthermore, we can add that, although individuals may have shared designs and motifs, they executed them according to personalised styles. Some of these differences may be, in part, due to tool choice, such as whether to use thick or thin nibbed incising implements, but other differences, such as those related to number of incisions per motif, or motif direction/orientation, may have been the result of personal dispositions and preferences. What we must do now is to move beyond isolated stamp groups and attempt to identify the works of individuals and how their works were influenced by their immediate peer groups and wider communities of practice operating both within and beyond the cemeteries.

The following section compares the styles and proportions of particular types of decoration at the Elsham and Cleatham cemeteries, revealing cemetery specific preferences for certain deigns and motifs, before moving to consider the spatial distribution of decorative types within the individual cemeteries. Finally, detailed consideration is given to discrete areas within these cemeteries. It will be shown that – by focusing on how decoration was structured and the tool, motif and stamp choices made by potters – on a vessel by vessel basis, we can begin to identify the work of individuals and to determine how their work relates to that of others in their communities.

Comparing the Cemeteries

As discussed in Chapter 1, in his study of the Cleatham urns Leahy developed a rigorous method by which to classify the decoration of cremation urns. Using his criteria it was possible to classify the Elsham urns and thus make comparisons between the frequencies of occurrence of the different types of decoration used at Elsham and Cleatham (Table 4.2). This revealed that some modes of decoration, such as Groups 04 and 05 (multiple horizontal bands containing decoration and continuous bands of vertical or angled grooves or bosses around the vessel, respectively), account for roughly equal proportions at both cemeteries, whilst other types are very different. At Cleatham, for example, Group 10 (urns decorated with chevrons) accounts for 20.1% of the decorated assemblage, but at Elsham it accounts for 32.8%. In contrast, there were only 7 (2.3%) examples of Group 03 at Elsham, but 36 (6.2%) at Cleatham. Group 03 decoration is very similar to Group 02, with both groups being largely just a band of incised decoration around the neck. Unsurprisingly, then, Group 02 is also considerably more common at Cleatham than Elsham. Similar levels of variation are seen between the occurrence of other groups; for example, incised cursive designs (Group 14) are three times more common at Cleatham than at Elsham, whereas vessels decorated with groups of vertical/angled lines or grooves (Group 07) account for 20.5% of Elsham's decorated vessels, but just 9.6% of those from Cleatham.

Cleatham Urn Group Classification	Cleatham: Number of Vessels	Proportion of all Cleatham Decorated Urns (%)	Elsham: Number of Vessels	Proportion of all Elsham Decorated Urns (%)
02	70	12.1	21	6.3
03	36	6.2	7	2.3
04	13	1.2	3	1.0
05	48	8.2	29	9.5
07	56	9.6	56	20.5
10	116	20.1	100	32.8
11	22	3.8	8	2.6
12	18	3.1	14	4.6
14	22	3.6	4	1.3
20	14	2.4	4	1.3

Table 4.2: A comparison of the frequency of selected decorative groups at Elsham and Cleatham.

Cleatham Urn Group Classification	Cleatham: Number of Urns	Proportion of all Cleatham Decorated Urns (%)	Elsham: Number of Urns	Proportion of all Elsham Decorated Urns (%)
02a	21	3.6%	6	2.0%
02b	9	1.6%	2	0.7%
02s	40	6.9%	11	3.6%
02n	0	0.0%	3	1.0%
05a	11	1.9%	7	2.3%
05b	21	3.6%	12	3.9%
05n	10	1.7%	6	2.0%
05s	6	1.0%	4	1.3%
07a	17	2.9%	18	5.9%
07b	19	3.3%	9	3.0%
07n	10	1.7%	15	4.9%
07s	10	1.7%	13	4.3%
07q	0	0.0%	1	0.3%
10a	49	8.5%	32	10.5%
10b	6	1.0%	3	1.0%
10q	0	0.0%	1	0.3%
10s	53	9.2%	63	20.7%
10x	8	1.4%	1	0.3%
11a	3	0.5%	1	0.3%
11q	7	1.2%	2	0.7%
11s	12	2.1%	5	1.6%
12a	4	0.7%	10	3.3%
12b	4	0.7%	1	0.3%
12n	3	0.5%	2	0.7%
12s	7	1.2%	1	0.3%

Table 4.3: Further comparisons between the frequencies of selected decorative groups at Elsham and Cleatham.

Breaking these groups down into their constituent parts reveals further cemetery specific preferences for particular types of decoration. For example, whilst the proportions of Group 12 urns (urns decorated with standing arches) are roughly equal at both cemeteries, Group 12a (standing arches without stamps) is five times more common at Elsham than Cleatham (Tables 4.2 and 4.3). In contrast, Group 12s urns (standing arches with stamps) are the most common Group 12 type at Cleatham, but amongst the least common at Elsham. It was noted that the chevron motif is much more common at Elsham than Cleatham, but looking at this in more detail reveals that this variation is solely a result of the sub-type 10s (chevrons with stamps). Group 10s accounts for 20.7% or decorated urns at Elsham, but just 9.2% at Cleatham; Groups 10a, 10b, 10q and 10x, on the other hand, appear in roughly equal proportions. It seems, then, that at Elsham the potters held a perception that chevrons should be accompanied by stamps. These results confirm Richards's (1987, 100-4) observation that whilst there is a high level of consistency in the types of decoration employed between the cemeteries, when analysis is undertaken on a cemetery by cemetery basis, there are differences in the way that motifs are used and the frequencies in which they occur. Given these varying levels of different types of decoration seen between the cemeteries of Elsham and Cleatham we must consider how these styles of decoration are organised within the cemeteries. For example, are these variations due to a small element of a cemetery's burial community making extensive use of a particular design, or is it a result of the burial community as a whole endorsing and proliferating specific modes of decoration? Consideration of the distributions of decorative types within the cemeteries helps to answer this question.

Cleatham

Beginning with one of the most common types of decorative design – chevron decorated urns (Leahy's Group 10a) – we can see that this group is widely distributed across the cemetery, but that small clusters do exist within this general spread (Figure 4.35). As this mode of decoration is believed to belong to Phase 1 (the earliest phase of the Cleatham cemetery – see Chapter 1), we can suggest that the chevrons motif was accepted by, and used by most, if not all, of the contemporary burial community. Other commonly used and widely distributed types include 05a, 05b, 05s, 07a, 07b, 07n, 07s[6] and again, being attributed to Phases 1-2, all are considered to be largely contemporary (Figures 4.36 and 4.37).

[6] Group 05 urns are decorated with a continuous band of vertical or diagonal lines around the vessel body whilst in Group 07 the vertical lines and bosses appear in groups – the a, b, s and n suffixes indicate that that the decoration consisted of just lines (a), lines and bosses (b), lines and stamp (s), and lines, bosses and stamps (n) (see Chapter 1, Table 1.2)

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Figure 4.35: Cleatham: the distribution of urns decorated with chevrons – Leahy's Group 10a (red dots).

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Figure 4.36: Cleatham: the distribution of urns decorated with a continuous band of vertical or angled lines – Leahy's Groups 05a, 05b, 05s, 05n (red dots).

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Figure 4.37: Cleatham: the distribution of urns decorated with groups of vertical or angled lines – Leahy's Groups 07a, 07b, 07s, 07n (red dots).

Following on from the basic chevron design we can consider the distribution of chevrons when accompanied by additional decorative elements; Leahy's Group 20n (chevrons, bosses and stamps), for example. This style of decoration is complex and as there are only thirteen examples in the Cleatham assemblage it is relatively rare. A distribution plot of this decorative type within the Cleatham cemetery reveals a restricted distribution (Figure 4.38) and we might suggest, then, that this was a localised variant, perhaps representing the use of a specific area of the cemetery by a single community. A similar phenomenon is observed when considering Leahy's Groups 02s and 02b (Figure 4.39 and 4.40) (urns decorated with incised lines and stamps around their necks, and urns decorated with bosses and incised lines around their necks, respectively). Group 02s were apparently used throughout Phases 2-4 of the cemetery's life and they are seen to occupy a relatively even distribution across the central section of the cemetery, yet two putative clusters can also be identified; one in the north and one in the west of the cemetery. Group 02b urns were less frequent than 02s and they too seem to have a relatively restricted distribution being largely confined to a small area in the north of the cemetery. It appears, then, that by plotting the distribution of decorative types we are being offered a window into localised decorative traditions employed by communities using the cemetery.

Richards (1987, Table 9) has noted that in most cemeteries standing and hanging arches (Groups 11 and 12) appear in roughly equal proportions and this is certainly true at Cleatham (Table 4.2). On the other hand, a plot of their distribution within the cemetery reveals some very interesting patterns. These motifs are not widely distributed and, indeed, they are largely restricted to a crescent shaped band along the eastern side of the cemetery (Figure 4.41). Unfortunately, as arches were used throughout the life of the cemetery (Leahy 2007a, 72, 109, 114), we cannot say for certain whether this is the result of chronological change, or the persistent use of certain areas by communities using arches as decorative motifs throughout the phases. What we can confidently identify, however, is that there is a clear divide between those areas of the cemetery in which arch motifs were used and those in which they are not.

Figure 4.38: Cleatham: the distribution of urns decorated with chevrons, stamps and bosses – Leahy's Group 20n (red dots). Note the concentration in the middle of

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Figure 4.39: The distribution of urns decorated with incised lines and stamps around the neck – Leahy's Group 02s (red dots). Note the dense concentrations on the western side of the cemetery and in the north of the cemetery (circled).

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Figure 4.40: The distribution of urns decorated with incised lines around the neck and bosses – Leahy's Group 02b (red dots). Whilst this type is rare, there are two areas where this type concentrates (circled).

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Figure 4.41: The distribution of urns decorated with arches, both standing and hanging – Leahy's Groups 11 and 12 (red dots). Note the crescent shaped distribution along the eastern edge of the cemetery.

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Figure 4.42: The distribution of urns decorated with standing arches – Leahy's Group 12 (red dots). Note that they are largely restricted to the north of the cemetery. Compare this with Figure 4.43, the distribution of hanging arches.

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Figure 4.43: The distribution of urns decorated with hanging arches – Leahy's Group 11 (red dots). Note that they are largely restricted to the south of the main burial area. Compare this with Figure 4.42, the distribution of standing arches. Urns found in the circled cluster are shown in Figure 4.44.

Exploring the distribution of these arch-decorated urns further reveals that hanging arches are largely restricted to the south of the cemetery, whilst standing arch urns are concentrated in the north (Figures 4.42 and 4.43). One could argue that the southern cluster of hanging arches, for example, developed as a result of a single potter producing a large number of hanging arch-decorated urns and then supplying them to his/her community. However, examination of these arched urns, on an urn-by-urn basis, reveals that other than possessing hanging arches there is nothing that would support such a hypothesis (Figure 4.44). Indeed, there is considerable variation in the number of lines used to draw each of the motifs, the thickness of the individual lines and the types of stamps that were used to accompany the lines. As discussed above, individuals seem to have had personalised preferences in the way that they executed the same designs – as there is little consistency in the way that these designs were executed here we can conclude that they do not represent the work of an individual. It does appear, however, that these urns were the work of a small number of potters who all made use of arch motifs. As these urns cluster together in the cemetery we might suggest that they indicate the use of this area by a specific community, that the potters living within this community were aware of one another's work and that they made considerable use of arched motifs – rather like the 'communities of practice' that were discussed above[7] and that the dead were being buried in family, community or household plots.

[7] As Bowser and Patton note, potters are part of, and pottery is produced within a 'community of practice' – a 'group of practitioners with a shared source of group identity' (Bowser and Patton 2008, 108).

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Figure 4.44: Hanging arch urns buried in the southern cluster highlighted in Figure 4.43. Consideration of potters' personal idiosyncrasies suggests that these urns were made by a small number of individuals, rather than a single potter. Urns 742 and 886 were probably the work of the same person; they share the same type of stamp and are decorated with three-line hanging arches. In contrast, urns 875 and 989 are decorated with four-line hanging arches and these two urns appear to be of the same form (1Bi – see Chapter 3); they probably represent the work of a second individual. Urns 714 and 692 are decorated with three-line hanging arches and finger impressions and might mark the work of a third potter, whilst urn 763 is unlike any of the others in this sample and probably represents the work of a fourth potter.

Elsham

Patterns in decorative distributions are not restricted to Cleatham, but as chronology obviously influences our interpretations of these distributions, due to the phasing work of Kevin Leahy, we must consider whether Leahy's phasing is applicable to Elsham. Classification of the Elsham urns according to Leahy's decorative groupings by default attributes a Cleatham Phase to each urn. For example, Group 10a urns belong only to Phase 1, whereas Group 10s, according to Leahy, spans Phases 3-4 (Table 1.3, Chapter 1). The author had access to the Elsham excavation archive and, in particular, the record cards for each individual urn. As these cards record details of stratigraphic relationships between vessels it was possible to compare the phases attributed to the Elsham urns on account of their decoration against real stratigraphic relationships. Information about these relationships was transferred from the cards in to an Excel database. A separate record was created for each vessel and this identified any urn that was above it, below it, beside it, mixed with it (in the form of smashed sherds), cut it, or was cut by it. In total 185 of the 625 Elsham urns could be placed into a relationship with another vessel. Following Leahy (2007a, 69-71), these relationships were termed Complexes and all related urns were assigned a Complex number. A total of 69 Complexes were identified but due to the level of preservation, and the nature of the relationships, 49 were considered un-useable. For example, in Complex 61 urns EL76MC and EL76PMb were found to be mixed together; these urns are attributable to Groups 07a and 06s, and thus Phases 1 and 2, respectively (see Appendix C). As the sherds from these two vessels were totally mixed together, it was not possible to determine whether they had been deposited contemporaneously, or if the burial of one had damaged the other; Complex 61 was, therefore, considered 'un-useable'. Similarly, Complexes containing urns of the same decorative type, buried contemporaneously, with no other relationship to any other urns, had to be discounted: Complex 4, for example. All such Complexes prove is that two urns, decorated in the same way, were buried at the same time; they do not tell us whether this type of decoration is later or earlier in the sequence than any other type of decoration. In total, then, 20 useful relationships were identified (Table 4.4 – continued over three pages).

Complex	Urn	Cleatham Decorative Group Classification of this Urn	Earliest Suggested ‘Cleatham Phase’ of Urn	Latest Suggested ‘Cleatham Phase’ of Urn	This Urn is Mixed With Urn(s):	This Urn is Adjacent to Urn(s):	Suggested ‘Cleatham Phases’ of Adjacent Urn(s):	This Urn is Below Urn(s):	Suggested ‘Cleatham Phases’ of Urn(s) above this Urn:	This Urn is is Above Urn(s):	Suggested ‘Cleatham Phases’ of Urn(s) Below this Urn:	Does the Stratigraphy of this Complex Agree with the Suggested ‘Cleatham Phasing’?
7	**5DM**	10a										YES
7	**5DL**	07s										YES
13	**5GT**	10a										NO
13	**5GU**	10s										NO
14	**5IV**	05n										YES
14	**5IU**	10s										YES
14	**5IC**	12a										YES
14	**5IB**	00										YES
18	**5JX**	01b										YES
18	**5JU**	02a										YES
20	**5KD**	09n										YES
20	**5KG**	22										YES
20	**5KH**	03s										YES
21	**5KVa**	05s/07s										NO
21	**5KVb**	11s										NO
22	**5KXb**	04s										NO
22	**5KXc**	19n										NO
23	**5KWa**	07a										NO
23	**5KWb**	02a										NO
27	**5PD**	01										YES
27	**5PBa**	01										YES

Complex	Urn	Cleatham Decorative Group Classification of this Urn	Earliest Suggested 'Cleatham Phase' of Urn	Latest Suggested 'Cleatham Phase' of Urn	This Urn is Mixed With Urn(s):	This Urn is Adjacent to Urn(s):	Suggested 'Cleatham Phases' of Adjacent Urn(s):	This Urn is Below Urn(s):	Suggested 'Cleatham Phases' of Urn(s) above this Urn:	This Urn is is Above Urn(s):	Suggested 'Cleatham Phases' of Urn(s) Below this Urn:	Does the Stratigraphy of this Complex Agree with the Suggested 'Cleatham Phasing'?
27	**5PBb**	20n										YES
27	**5PC**	07b										YES
28	**5PO**	16b										YES
28	**5PG**	13q										YES
29	**5PHa**	10s										NO
29	**5PHb**	07a										NO
29	**5PHc**	10s										NO
29	**5PHd**	01										NO
30	**5PMa**	10s										NO
30	**5PMb**	07n										NO
31	**5PV**	02s										YES
31	**5PVb**	00s										YES
31	**5PVc**	10s										YES
31	**5QI**	07s										YES
31	**5QIb**	00s										YES
34	**6AD**	22										YES
34	**6AN**	06s										YES
34	**6AM**	01										YES
41	**6CAa**	07a										NO
41	**6CAb**	05b										NO
41	**6CC**	10a										NO

Complex	Urn	Cleatham Decorative Group Classification of this Urn	Earliest Suggested 'Cleatham Phase' of Urn	Latest Suggested 'Cleatham Phase' of Urn	This Urn is Mixed With Urn(s):	This Urn is Adjacent to Urn(s):	Suggested 'Cleatham Phases' of Adjacent Urn(s):	This Urn is Below Urn(s):	Suggested 'Cleatham Phases' of Urn(s) above this Urn:	This Urn is is Above Urn(s):	Suggested 'Cleatham Phases' of Urn(s) Below this Urn:	Does the Stratigraphy of this Complex Agree with the Suggested 'Cleatham Phasing'?
43	**6DGa**	07s										NO
43	**6DGb**	00s										NO
43	**6DH**	10s										NO
46	**6FB**	01p										YES
46	**6FC**	10s										YES
47	**6ED**	07s										YES
47	**6DX**	01										YES
52	**6HO**	07s										YES
52	**6HQ**	01b										YES
63	**6NEa**	07n										YES
63	**6NEb**	15s	Rights have not been obtained for the use of this data in electronic media									YES

Table 4.4: Table of all useful Elsham urn complexes. Twenty useful complexes were identified, of these only eight complexes disagree with the phases suggested by Leahy's Cleatham phasing (see Appendix C for all complexes).

In a number of instances the stratigraphic relationships between the urns in the 20 useful Complexes were in agreement with Leahy's phasing. For example, in Complex 7 we see that a Phase 1 urn was found below a Phase 1-2 urn (Table 4.4), similarly, in Complex 63 (Table 4.4) a Phase 1-2 urn was found stratigraphically below a Phase 4-5 urn. In contrast, however, in Complex 30, a Phase 3-4 urn was found stratigraphically below a Phase 1-2 urn, whilst in Complex 21, an urn attributed to Phase 5 was found below a Phase 1-2 urn (Table 4.4). These are not isolated instances; indeed, eight of the 20 useful relationships do not agree with Leahy's Phasing and from this we must conclude that Leahy's Phasing is not applicable beyond the bounds of Cleatham. With this in mind, any distributions highlighted in the Elsham cemetery cannot be supported by the Cleatham phasing.

The Distributions

Beginning with the distribution of the commonly occurring chevron motif, Leahy's Group 10, we can see that this group is widely distributed across the site (Figure 4.45). However, by breaking the group down into its constituent parts (i.e. 10a, 10s, and 10b) reveals some very interesting patterns. Whilst Group 10a urns are common on the eastern side of the cemetery, but for a very small dense cluster, they are largely absent from the western side of the cemetery (Figure 4.46). If we look at the urns in this cluster we can see that it is unlikely that a single individual was responsible for all of them. Indeed, there is considerable variation between the decoration of each urn, both in terms of line thickness, and numbers of lines used to make up chevrons in the Main Motif Zone and the horizontal lines that define the Horizontal Zone (Figure 4.47). As these urns cluster together in the cemetery we might suggest that they indicate the use of this area by a specific community, that the potters living within this community were aware of one another's work and that they made considerable use of chevron motifs – rather like the 'communities of practice' that were discussed above. It can be inferred, then, that a specific community was using a particular burial pot and that they either employed this motif prolifically over a short period of time, or they made use of the same burial plot and the same motif over the generations.

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Figure 4.45: The distribution of Elsham's chevron-decorated urns (Leahy's Group 10).

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Figure 4.46: The distribution of Elsham's Group 10a urns i.e. only incised chevrons, without accompanying stamps or bosses. Note the highlighted cluster on the eastern side of the cemetery. See Figure 4.47 for examples of urns found in this cluster.

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Figure 4.47: Urns decorated with chevrons (Leahy's Group 10a) found in the cluster of urns highlighted in Figure 4.46. Note that although they are all decorated with chevrons, the ways in which these motifs are decorated are all very different. Only EL75HU and EL75GX bear any stylistic resemblance to one another. This suggests that a number of potters were responsible for these urns.

It was noted above that 20.7% of Elsham's decorated urns were attributable to Group 10s (urns decorated with chevrons and stamps) and the question posed was whether this was the result of a single community making extensive use of this mode of ornamentation, or whether this type of decoration was widely used by the whole burial community. From the spatial distribution of this type of decoration (Figure 4.48) within the cemetery it would appear that it is probably the latter case. Indeed, but for a single, dense concentration in the ditch in the south-western corner, Group 10s urns are relatively evenly distributed across the whole cemetery.

Like the chevron motif, continuous or broken bands of vertical or angled lines were commonly used by the whole Elsham community (Leahy's Group 05 and 07) and these modes of ornamentation are spread across the entire site (Figures 4.49 and 4.50). Arch motifs are similarly distributed (Figure 4.51), but when these are separated into hanging and standing arches this reveals that, as at Cleatham, there are two clear distributions. Hanging arches are largely restricted to the eastern side of the cemetery, whilst standing arches are most common, and densely cluster, in the west (Figures 4.52 and 4.53). Once more we might question whether this western group, for example, is the result of a prolific potter, but as Figure 4.54 demonstrates there is nothing to support such a hypothesis. Indeed, as the ethnographic examples discussed above, and Richards's (1987) analysis of vessels attributed to individual Anglo-Saxon potters demonstrates, individuals seem to have had personalised preferences in the way that they executed the same design. As there is no consistency in the way that these designs were executed we can conclude that they do not represent the work of an individual. Indeed, of the ten urns shown in Figure 5.54 only EL75GR, EL75KD and EL75NA bear any resemblance to one another, and might represent the work of a single potter, whilst EL75MI and EL75OQ might be another.

To summarise, whilst some motifs were very popular and were widely used by the whole burial community, other motifs appear to have been used by only small groups who apparently buried their dead in close proximity. The following section explores this phenomenon further, but rather than focusing on the distribution of different decorative groups it explores the relationship between individual vessels within discrete areas of the cemetery. In particular, analysis focuses on the decorative structures employed by the potters, the types of stamps and motifs that they used and their personalised idiosyncrasies in execution (such as the number of lines in the Horizontal Zone, or the number of lines used to draw a chevron). Given that the

Cleatham phasing is not applicable to the Elsham urns, only Cleatham is considered in detail, because, as will be seen below, the phases of these vessels hold considerable weight in the interpretation of these relationships. Furthermore, not all of Elsham's urns are illustrated and without these illustrations it is not possible to fully appreciate the similarity in the decoration of urns within specific areas of the cemetery.

Figure 4.48: The distribution of Elsham's Group 10s – urns decorated with chevrons and stamps. Compare this to the distribution of urns decorated with chevrons but no stamps (Group 10a), Figure 4.45.

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Figure 4.49: The distribution of Elsham's Group 05 urns – urns decorated with a continuous band of vertical or angled lines and/or bosses around the body.

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Figure 4.50: The distribution of Elsham's Group 07 urns – urns decorated with groups of vertical or angled lines and/or bosses around the body.

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Figure 4.51: The distribution of Elsham's arch decorated urns (both standing and hanging – Groups 11 and 12).

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Figure 4.52: The distribution of Elsham's hanging arch urns (Leahy's Group 11 urns). Note that they are mainly found in the eastern half of the cemetery. Compare this to the distribution of standing arch urns in Figure 4.53.

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Figure 4.53: The distribution of Elsham's standing arch urns (Leahy's Group 12 urns). Note that they are mainly found in the western half of the cemetery. Compare this to the distribution of hanging arch urns in Figure 4.52. Urns in the highlighted area are shown in Figure 4.54.

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Figure 4.54 (continued overleaf): Standing arch urns from the area of the Elsham cemetery highlighted in Figure 4.53.

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Figure 4.54 (continued): A selection of urns from the area highlighted in Figure 4.53. Only urns EL75OQ and EL75MI, with their thinly incised three-line standing arches that lean to the left might be considered the product of a single potter. Likewise the EL75KD, EL75GR, and EL75NA, with their deeply grooved two- and three- line standing arches and decorated bosses might be considered to be the work of another. None of the idiosyncrasies of the remaining vessels suggest that these urns were made by a single individual.

Communities, Families and Potters

In order to reduce the problems inherent in studying large areas of densely packed intercutting urns, rather than consider the entire Cleatham cemetery, the types of urn decoration used by the communities burying their dead in two discrete areas of the cemetery with varying burial densities are examined and compared. For simplicity, these areas are here termed Study Area 1 and Study Area 2. Study Area 1 is located on the western side of the cemetery; it consists of 69 decorated urns spread over an area of c.15m x 18m. Study Area 2 is located in the very north of the cemetery and contains 106 urns in an area c.16m x 10m area (Figure 4.55). As the focus is on decoration, all plain urns and those urns for which it has not been possible to ascertain their decorative designs due to a poor state of preservation (those classified as 00), have been disregarded from the analysis of these areas.

Study Area 1

In this area seven groups of vessels were identified that are so similarly decorated that they probably represent the work of an individual – rather like the stamp groups that were discussed previously in the chapter. Rather than refer to them as stamp groups it was decided that Vessel Group was a more appropriate term as it encapsulates all forms of decoration, not just stamped urns. The decoration which characterises each Vessel Group is now discussed, and then consideration is given as to how the seven Vessel Groups compare to one another.

Vessel Group 1 comprises six urns, all of which were buried within a very small area, c.1m x 3m area (Figures 4.56 and 4.57 and Table 4.5). The work on these urns is characterised by its Horizontal Zone, comprising alternating bands of thinly incised lines and stamps, three-line chevrons in the Main Motif Zone, and the use of three styles of stamp. Urns 573 and 598 are both of the same form (1Bi – see Chapter 3) and their Horizontal Zones are decorated with bands of incised lines and stamps (these urns are classified by Leahy as 02s). Although different stamping tools were used on both vessels, the *same type* of stamp was used on both (a circular cross-hatched grid, Briscoe's A3a). Both have the same number of bands around the neck and an equal number of lines in each band.

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Figure 4.55: Cleatham: the locations of Study Area 1 and Study Area 2.

Urn Number	Classification	Earliest Phase	Latest Phase	Urn complex	Fabric
567	10s	3	4	0	SST
572	07n	1	2	0	SST
573	02s	2	4	0	SST
577	10s	3	4	8	FE
598	02s	2	4	0	ESGSNL
600	10s	3	4	0	SSTNL

Table 4.5: Characteristics of urn attributed to Vessel Group 1.

Figure 4.56: Urns attributed to Vessel Group 1. Note the similarity in design structure, use of and styles of stamps and the way in which incised lines are executed (Figures from Leahy 2007c). See Figure 5.57 for burial locations of these urns within the Cleatham cemetery.

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Figure 4.57: Study Area 1 – the locations of urns attributed to Vessel Group 1 (red). See Figure 4.56 for images of these urns.

The remaining four urns in this Vessel Group are decorated with incised motifs placed in the Main Motif Zones. Three of the four urns employ three-line chevrons (urns 567, 600 and 577), and they are attributable to Leahy's Group 10s, whilst the final urn is decorated with groups of vertically incised lines and bosses and is classified as Leahy's Group 07n (urn 572). Urns 577, 573 and 598 share the same type of stamp (Briscoe's A3a), though not from the same die, whilst urn 567 uses a divided oval similar to those seen on urns 572 and 573 (Briscoe's D 1b, again from different dies). Finally, two similar segmented-circle stamp designs are seen on urns 600 and 567. As none of these pots share a stamp deriving from the same die we might suggest that they are the product of different potting occasions. This deduction is maintained by the fact that none come from the same batch of clay (they are made from four different ceramic fabrics (Table 4.5). Nevertheless, we can see that they are probably the product of a single person. Support for this suggestion can be found by considering the phases to which these vessels have been attributed. All but one of these vessels was attributed to the Phases 2-4 by Leahy, and as such they must be considered broadly contemporary with one another (Table 4.5). Interestingly, we see that this group contains the range of vessels that, as was discussed in Chapter 3, would be required for the production and consumption of fermented beverages (a storage vessel (567), a mixing vessel (572), fermenting vessels (573, 577 and 598) and a serving vessel (600), see Figure 3.51). Given how close together each of these urns were buried in the cemetery, we might suggest that they represent the burial of a family or household group.

Fewer urns were attributable to Vessel Group 2, and being confined to a c.7m^2 area these urns are slightly more dispersed than Vessel Group 1 (Figure 4.58 and 4.59 and Table 4.6). This group is characterised by thinly incised two-line chevrons in the Horizontal Zone and an absence of decoration in the Main Motif Zone. The chevrons in the Horizontal Zone of urns 470 and 487 are enclosed by bands of horizontal incised lines above and below them. It is probable that urn 558 was also decorated in this way, but the level of preservation prevents us from confirming this. Urns 487 and 558 are both decorated with negative circular stamps (Briscoe's A1b and A2c), although these stamps are not from the same die (Figure 4.58). Importantly, neither 470 nor 487 are stamped, but on account of the similarity in their linear decoration we can clearly see that they belong to this group. Encouragingly all but one of the vessels in this group (urn 487) was placed in Phase 2 by Leahy, suggesting that these are indeed contemporary (Table 4.6).

As the urns belonging to Vessel Group 2 are buried so close together, within an area c. 7m^2, we might suggest that they represent the use of a small area of the cemetery by a single family or household and that these four vessels are the product of a single household producer. Yet, since these vessels were manufactured in different fabrics we can also propose that they are the product of different production episodes. This is supported by the fact the two stamped vessels in this group, whilst being decorated with the same type of stamp (ring shaped stamps), were not decorated with the same stamp die – there are different numbers of concentric rings in the stamp impressions on the urns (Figure 4.58). Intriguingly, this potter also produced the repertoire of vessels required for the production and consumption of fermented produce (see Chapter 3 – 486 is of form 1Aii; 487 is 4Aii; 558 is probably 2Bi; 470 is the cup-type 3Aiii).

Urn Number	Classification	Earliest Phase	Latest Phase	Urn complex	Fabric
470	03a	2	2	52	ESAXLOC
486	03a	2	2	0	CHARN
487	03s	1	3	0	ESMG
558	03s	2	2	2	ESMG

Table 4.6: Characteristics of urn attributed to Vessel Group 2.

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Figure 4.58: Urns attributed to Vessel Group 2. Note the similarity in design structure, particularly the use of the two-line chevron in the Horizontal Zone, the absence of decoration in the Main Motif Zone and the use of ring stamps (Figures from Leahy 2007c). See Figure 4.59 for burial locations of these urns within the Cleatham cemetery.

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Figure 4.59: Study Area 1 – the locations of urns attributed to Vessel Group 2 (red). See Figure 4.58 for images of these urns.

Vessel Group 3 comprises just three urns (Table 4.7 and Figure 4.60). These three urns were buried within just a few metres of one another (Figure 4.61). The decoration on each of the urns in this group is of a somewhat chaotic nature. The Main Motif Zones of urns 1014 and 489 are decorated with overlapping hanging arches, chevrons and slashed and vertical horizontal lines. The number of lines per motif is variable as are the thicknesses of the lines used to draw them. Both urns possess the same stamp, although not deriving from the same die (Briscoe's A4d) – they are different sizes – and the decoration in the Horizontal Zones of each consists of three horizontal lines. Urn 1003 is unstamped, but as is the case with the other urns in this Vessel Group (1014 and 489), the decoration in the Horizontal Zone comprises three incised lines, whilst the Main Motif Zone contains overlapping chevrons with varying numbers of line per motif.

One problem with the interpretation that the three urns belonging to Vessel Group 3 are the product of an individual is that Leahy attributes urns 1003 to Phase 1 and urn1014 to Phase 5; Leahy did not phase urn 489 (Table 4.7). However, none of the vessels in this group were found to be in a stratigraphic relationship with another and it was purely on the basis of the style of decoration that Leahy assigned phases to them. As these vessels are so similar in form, fabric (ESGSNL, characterised by calcareous sandstones – see Chapter 5), and decoration, the evidence strongly suggests that they are contemporary with one another.

Vessel Groups 4, 5 and 6 each have only two vessels attributed to them. The same styles of stamps were used to decorate the urns that belong to Vessel Group 4 (Figure 4.62 and 4.65 and Table 4.8) (though not from the same die – note the difference in the broken ring stamps), the incised lines are of the same thickness, and the Horizontal Zones of both of these vessels are decorated in almost exactly the same manner. Leahy attributes both vessels to the same phase, but as the fabrics of each are different we might suggest that even though they were probably produced by the same person that they were made on different potting occasions. Urn 513 is of form 1Bi and 590 is of cup-type 3Biii (see Chapter 3) and thus, like the other Vessel Groups discussed above, we see putative fermentation vessels and drinking vessels being produced by the potter responsible for this group.

Urn Number	Classification	Earliest Phase	Latest Phase	Urn complex	Fabric
489	20x	Un-phased	Un-phased	0	SST
1003	10a	1	1	0	SST
1014	19n	4	5	0	ESGSNL

Table 4.7: Characteristics of urn attributed to Vessel Group 3.

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Figure 4.60: Urns attributed to Vessel Group 3. Note the similarity in decoration, particularly the use of similar stamps and the chaotic execution of the motifs in the Main Motif Zone (Figure from Leahy 2007c).

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Figure 4.61: Study Area 1 – the locations of urns attributed to Vessel Group 3 (red). See Figure 4.60 for images of these urns.

The two urns that belong to Vessel Group 5 were buried just c.2m apart (Figures 4.63 and 4.65 and Table 4.9). Both are decorated with groups of vertically incised lines and circular impressions (notably as there are unequal numbers of lines in each group of vertically incised lines, Leahy classifies these as two decorative groups – 05n and 19n). Although we cannot identify the form of these two vessels, due to their poor levels of preservation, enough remains to recognise that they both had maximum diameters of 20cm. As both are of the same fabric there is potential that they were the product of the same manufacturing occasion.

The two urns belonging to Vessel Group 6 were buried less than 1m apart (Figures 4.64 and 4.65 and Table 4.10). Both are decorated with a band of three-line chevrons and three-line hanging arches in the Main Motif Zone. They appear to be of the same form, although they are different sizes, however this cannot be confirmed as the upper half of urn 555 is missing. As these two vessels were made of the same ceramic fabric it is possible that they were produced in the same potting occasions. (Table 4.10). Notably, urn 555 is not stamped, but indents, produced most probably by finger impressions, have been used to decorate the vessel in the same way that the stamps seen on urn 831 were used. Like Vessel Group 3 (above), then, it seems that by looking at the decoration of urns that were buried in close proximity to one another we can begin to identify vessels most likely produced by a single individual. Moreover, we see that whilst individual potters decorated some of their pottery with stamps, they did not always stamp this decorated pottery.

Urn Number	Classification	Earliest Phase	Latest Phase	Urn complex	Fabric
513	02s	2	4	0	SST
590	02s	2	4	0	ESAXLOC

Table 4.8: Characteristics of urn attributed to Vessel Group 4.

Urn Number	Classification	Earliest Phase	Latest Phase	Urn complex	Fabric
510	05s	1	2	0	SST
511	19s	2	2	0	SST

Table 4.9: Characteristics of urn attributed to Vessel Group 5.

Urn Number	Classification	Earliest Phase	Latest Phase	Urn complex	Fabric
555	18a	Un-phased	Un-phased	0	SST
831	18s	4	4	0	SST

Table 4.10: Characteristics of urn attributed to Vessel Group 6.

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Figure 4.62: Urns attributed to Vessel Group 4. Note the similarity in design structure and the use of the same types of stamp on both urns (figures from Leahy 2007c).

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Figure 4.63: Urns attributed to Vessel Group 5. Note the similarity in design structure and execution and the use of finger impressions as 'stamps' (figures from Leahy 2007c).

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Figure 4.64: Urns attributed to Vessel Group 6. Note the similarity in design structure, particularly the double band of motifs in the Main Motif Zone, and the similarity in vessel shape, despite their different sizes (figures from Leahy 2007c).

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Figure 4.65: Study Area 1 – the locations of urns attributed to Vessel Groups 4 (blue), 5 (red) and 6 (blue). See Figures 4.62, 4.63 and 4.64 for images of these urns.

Finally, although less well defined, we have Vessel Group 7. Vessels accredited to this group are again largely confined to a small area, c.9m^2 (Figure 4.66 and 4.67). All but urns 444 and 463 are attributable to Leahy's 02s decorative group and all but 463 employ the typical 'hot-cross-bun' stamp (Briscoe's A4ai, though from different dies). Intriguingly both 465 and 569 are very similar in design structure to those urns attributed to Vessel Group 1, whilst the form of 465 is the same form as Vessel Group 1's urn 567. It is probably no coincidence, then, that 569 was buried just c.1.5m from vessels attributed to Vessel Group 1 (Figures 4.56, 4.57, 4.66 and 4.67).

Given these similarities in the decoration of urns attributed to Vessel Groups 1 and 7 and the proximity to one another in which urns belonging to these two groups were buried, we might suggest that the potters responsible for these vessels were exposed to one another's work; certainly, based on Leahy's phasing, these groups can be seen to be broadly contemporary (Tables 4.5 and 4.11). If this is the case then it appears that we are being offered a window into the potters' community of practice. A broader comparison of the stamps, structure and motifs employed by the potters in Study Area 1 supports such a notion. We have already noted that urns belonging to Vessel Groups 1, 4, and 7 are decorated according to Leahy's Group 02s, but when we plot the locations of 02s urns in this Study Area, as a whole, we see that all but one of these vessels (urn 513) is located in a very small c.3 x 7m area in the north west of Study Area 1 – the place where urns belonging to Vessel Groups 1, 4 and 7 are all located (Figure 4.68).

Urn Number	Classification	Earliest Phase	Latest Phase	Urn complex	Fabric
444	07n	1	2	0	CHARN
452	02s	4	4	11	SST
463	07a	1	1	0	?
464	02s	2	4	0	ELCHARNLOC
465	02s	2	4	0	LIMES
495	02s	2	4	0	ESMG
569	02s	2	4	0	CHARN

Table 4.11: Characteristics of urns attributed to Vessel Group 7.

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Figure 4.66: Urns attributed to Vessel Group 7. These urns are characterised by the use of the 'hot-cross bun' style of stamp and, but for urns 463 and 444, an absence of decoration in the Main Motif Zone.

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Figure 4.67: Study Area 1 – the locations of urns attributed to Vessel Group 7 (blue). See Figure 4.66 for images of these urns.

Allied to the cluster of Group 02s urns, we can consider the distribution of urns that are decorated with incised-line-motifs in the Horizontal Zone (Leahy's Groups 03a and 03s). There are six such urns in Study Area 1 (Tables 4.6 and 4.12, and Figures 4.58, 4.59 and 4.69), four of which are attributed to Vessel Group 2, and all six cluster in a relatively restricted zone (Figure 4.70). It is suggested here then that the potters responsible for these six urns were working within the same community of practice and were producing similar designs to one another because they were exposed to one another's work. This is supported by the fact that Leahy attributed the majority of these urns to Phases 2-3 (Tables 4.6 and 4.12). Further to this we can consider the distribution of individual stamp types. It was noted that negative circular stamps (Briscoe's Alb and A2c) were used to decorate two vessels belonging to Vessel Group 2 and encouragingly, a plot of this stamp type more broadly reveals that of the five urns that were decorated with them, all are located in the southern half of Study Area 1 (Figure 4.71). Moreover, all but one of these vessels is placed in Phases 1-3 (Table 4.13). Intriguingly, urn 467, which was not stamped with a ring shaped tool, but has ring-shaped incisions circling a segmented circle stamp, is also located in the southern half of Study Area 1 (Figures 4.58, 4.60, 4.71 and 4.72). To the distribution of circular stamps we can add the distribution of hot-cross bun stamps (Briscoe's 4Ai). Urns decorated with such stamps are largely confined to the north of the Study Area 1, and, again, as the majority of these hot-cross bun stamped urns are placed in Phases 2-4, we might consider them broadly contemporary (Figure 4.73 and Table 4.14).

Urn Number	Classification	Earliest Phase	Latest Phase	Urn complex
460	03a	2	2	0
468	03s	1	3	0

Table 4.12: Urns decorated with incised motifs in the Horizontal Zone – see also Vessel Group 2 (Table 4.6).

Urn Number	Classification	Earliest Phase	Latest Phase	Urn complex	Vessel Group
467	22s	Un-phased	Un-phased	0	-
468	03s	1	3	0	-
487	03s	1	3	0	2
489	20x	Un-phased	Un-phased	0	3
552	12s	4	4	0	-
1005	07s	2	2	0	-

Table 4.13: Urns decorated with unbroken ring shapes.

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Figure 4.68: Study Area 1 – the locations of urns decorated in the style of Leahy's Group 02s – urns decorated with incused lines and stamps around the neck.

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Figure 4.69: Urns decorated with incised line motifs in the Horizontal Zone - see also Vessel Group 2, Figure 4. 58. For the burial locations of these urns, see Figure 4.70.

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Figure 4.70: Study Area 1 – the locations of urns decorated with incised lines motifs in the Horizontal Zone.

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Figure 4.71: Study Area 1 – the locations of urns decorated with unbroken ring shaped stamps. Arrow points to urn 467 (see Figure 4.72).

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Figure 4.72: Cleatham urn 467. This urn is not decorated with a ring shaped stamp, but stamps are enclosed in ring-shaped incisions. It was buried amongst a number of urns with ring shaped stamps (see Figure 4.71).

Urn Number	Classification	Earliest Phase	Latest Phase	Urn complex	Vessel Group
444	07n	1	2	0	7
452	02s	4	4	11	7
464	02s	2	4	0	7
465	02s	2	4	0	7
494	22s	Un-phased	Un-phased	0	-
495	02s	2	4	0	7
498	15s	4	5	0	-
503	07s	2	2	0	-
513	02s	2	4	0	4
569	02s	2	4	0	7
590	02s	2	4	0	4
599	19n	4	5	0	-
1014	19n	4	5	0	3

Table 4.14: Urns decorated with 'hot-cross bun' style stamps (Briscoe's A4ai). See Figure 4.73 for the burial locations of these urns.

Figure 4.73: Study Area 1 – the locations of urns decorated with 'hot-cross bun' type stamps (Briscoe's A4ai stamp).

From the examples of these seven Vessel Groups we can see that, by considering the way that designs are structured, the way in which individual motifs are executed (for example in the number of lines per chevron or hanging arch), and the types of stamps that are used, it is possible to identify the work of individuals. By doing this we can recognise groups of urns, such as those in Vessel Groups 2 , that contain both stamped and un-stamped urns that were probably made by the same person – such observations are what set this study apart from those studies that focus wholly on stamps and do not consider all other vessels collectively. This clearly demonstrates the agency of the individual potter, for example, in the decision to stamp or not to stamp a vessel after it had been decorated with incised lines.

As the urns belonging to individual Vessel Groups were often buried no more than a few metres from one another we can suggest that they might indicate that burial was taking place in family plots. Moreover, by comparing each urn and Vessel Group with those that surround it, we can begin to see how potters operating within communities might have influenced one another; again this is something that studies which focus wholly on stamps fail to do. For example, Vessels Groups 1, 4 and 7 all contain pottery classified as Leahy's decorative Group 02s (horizontal lines around the neck and stamps) and the urns belonging to all three Vessel Groups are located within just a few metres of one another in the north of Study Area 1. Similarly, Vessel Group 3 comprises urns which are characterised by incised motifs within the Horizontal Zone. All urns belonging to this group are located within the south of Study Area 1. Other vessels that were not attributed to particular Vessel Groups, but were decorated in this style, are also located in the southern half of Study Area 1. It really does appear, then, that the potters whose urns were buried close to one another's in the cemetery were aware of each other's work and that they influenced and took influence from one another. Such patterns are repeated throughout the cemetery, and to reinforce this, a second area is briefly discussed.

Study Area 2

Study Area 2 is located on the opposite side of the Cleatham cemetery to Study Area 1 (Figure 4.55). The urns in this area are more densely packed than those in Study Area 1 but as with the urns in Study area 1 it is possible to identify the works of individuals and demonstrate how their works relate to one another's. Seven Vessel Groups have been identified in this area – Vessel Groups 8-14 (Figures 4.74 to 4.84 and Tables 4.15 to 4.21). Due to the consistency in the types of decoration used by early Anglo-Saxon potters (see Richards 1987, for example) it is not surprising that we see the same repertoire of motifs represented in both Study Areas 1 and 2. These motifs do, however, appear in slightly different proportions.

Urn Number	Classification	Earliest Phase	Latest Phase	Urn complex	Fabric
139	14b	1	1	0	SST
158	14b	1	1	0	LIMES
172	14a	1	1	7	SST
191	08b	Un-phased	Un-phased	113	SST
286	20n	1	3	0	SST
318	19b	1	1	54	SST
1037	14a	1	1	0	SST

Table 4.15: Vessel Group 8 (See Figures 4.74 and 4.75).

Urn Number	Classification	Earliest Phase	Latest Phase	Urn complex	Fabric
141	10s	3	4	0	NELESGS
228	02s	4	4	3	CHARN
1032	06q	3	3	25	?
1107	02s	4	4	25	SSTMG
1108	06q	3	3	25	SST

Table 4.16: Vessel Group 9 (See Figures 4.76 and 4.77).

Urn Number	Classification	Earliest Phase	Latest Phase	Urn complex	Fabric
236	02s	4	4	3	SST
257	09s	3	3	0	ESMG
259	10x	5	5	25	ESAXLOC
273	10s	4	4	49	FE
1085	05n	4	4	0	?

Table 4.17: Vessel Group 10 (See Figures 4.78 and 4.79).

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Figure 4.74: Urns attributed to Vessel Group 8. Urns in this group are characterised by their deeply grooved two- to four-line motifs, particularly arches, in the Main Motif Zone, thin vertical bosses, which divide the Main Motif Zone into panels, and three to four lines in the Horizontal Zone. Also note the similarity in form of each of these urns. All belong to Phase 1 (Table 4.15) and their burial locations are shown in Figure 4.75.

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Figure 4.75: Study Area 2 – the locations of urns attributed to Vessel Group 8 (see Figure 4.74).

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Figure 4.76: Study Area 2 – the locations of urns attributed to Vessel Group 9 (see Figure 4.77).

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Figure 4.77: Urns attributed to Vessel Group 9. Urns in this group are characterised by the structure of their Horizontal Zones and the types of stamps used. In the Horizontal Zones of urns 141, 228 and 1107 we see single incised lines bordering bands of stamp (unfortunately the neck region of 1032 and 1108 were not preserved). The same type of cross-shaped stamp is used on urns 141 and 1107, and the same gridded circle stamps a used on 228, 1032, 1108 and 1107. Although incomplete, the forms of 1107 and 228 appear to be the same and urns 1108 and 1032 seem to be small and large versions of the same vessel form. All five urns were buried within less than 2m of one another and all were attributed to Phases 3-4 by Leahy (2007c) (see Figure 4.76 and Table 4.16).

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Figure 4.78: Urns attributed to Vessel Group 10. Urns in this group are characterised by a double row of stamps, bordered by either a double or triple band of horizontal lines, in the Horizontal Zone (except urn 0273, which only has a single band of stamps). In the main, the chevron and arch motifs found in the Main Motif Zone are composed of three lines. The same style of stamp was used on urns 257, 273 and 1085, whilst cross shapes stamps are found on 259 and 236. All urns belong to Phases 3-5 and all were buried within 3m of one another (Table 4.17 and Figure 4.79).

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Figure 4.79: Study Area 2 – the locations of urns attributed to Vessel Group 10 (see Figure 4.78).

Vessel Group 8 is distributed throughout the study area. Despite this, the urns appear to be buried in pairs (though not in the same urn pit), with the urns in each pair being c. 2m apart (Figure 4.75). This group is characterised by wide incised-line cursive motifs, standing and hanging arches and a lack of stamps. Notably all urns attributed to this group belong to Leahy's Phase 1, all are of similar form and all but one was manufactured in the same fabric (Table 4.15 and Figures 4.74 and 4.75). Other pots in this area also make use of hanging and standing arch motifs − Vessel Groups 8, 11 and 14, for example − and as with the ethnographic examples, each of these potters had their own way of representing the motif (Figures 4.74, 4.80 and 4.83). Furthermore, as all vessels attributed to Groups 8, 11 and 14 belong to Phase 1, we might suggest that they are largely contemporary and that these potters may have even been aware of one another's work (Tables 4.15, 4.18 and 4.21).

Urn Number	Classification	Earliest Phase	Latest Phase	Urn complex	Fabric
173	07a	1	1	7	FE
192	07a	1	1	48	ESMG
194	12b	1	1	48	ECHAF

Table 4.18: Vessel Group 11 (See Figures 4.80 and 4.81).

Urn Number	Classification	Earliest Phase	Latest Phase	Urn complex	Fabric
328	22s	Un-phased	Un-phased	0	FE
353	10s	3	4	0	FE

Table 4.19: Vessel Group 12 (See Figures 4.81 and 4.82).

Urn Number	Classification	Earliest Phase	Latest Phase	Urn complex	Fabric
145	10s	3	4	0	FE
146	10b	Un-phased	Un-phased	0	SST

Table 4.20: Vessel Group 13 (See Figures 4.81 and 4.83).

Urn Number	Classification	Earliest Phase	Latest Phase	Urn complex	Fabric
129	13n	1	1	0	FE
137	13n	1	1	0	FE

Table 4.21: Vessel Group 14 (See Figures 4.81 and 4.84).

To the penchant for arches we can add that the potters whose urns were buried in this area of the cemetery made use of segmented circle stamps and their variants (Briscoe's A5d and A5f) (Tables 4.22 and 4.23 and Figure 8.85 and 8.86). The A5f stamp type was completely absent from Study Area 1, but there are six examples in the second area and all cluster loosely in the centre. Three of the urns decorated with this stamp-type were assigned by Leahy to Phases 1-2, two belong to Phases 4-5, and the final example remains un-phased (Table 4.22); none appear to originate from the same die. As this type of stamp is very similar to Briscoe's A5d, it is unsurprising that the potters in this area also made extensive use of the A5d stamp, whilst those in Study Area 1 did not. Despite the difference in occurrence of the segmented circle stamps in Study Areas 1 and 2, potters in both areas made use of the gridded circle motif (Briscoe's A3a), particularly the potters responsible for urns in Vessel Groups 1 and 9 (Figures 4.56 and 4.77), and the hot-cross-bun stamp (Briscoe'A4Ai), but this latter type was is considerably less popular in Study Area 2; just 7 (7%) urns possess this stamp in Study Area 2, compared to 14 (20%) in Study Area 1.

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Figure 4.80: Urns attributed to Vessel Group 11. Urns in this group are characterised by a Horizontal Zone composed of three incised lines. The Main Motif Zones of urns 173 and 192 are composed of groups of five to six slightly angled lines. Although urn 194 does not possess the same type of decoration in the Main Motif Zone, its form is identical to that of 192. All belong to Phase 1 (Table 4.18) and all were buried within 1m of one another (Figure 4.84).

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Figure 4.81: Urns attributed to Vessel Group 12. Urns in this group are characterised by their forms, fabric and use of chevrons in the Main Motif Zone (Table 4.19). Both were buried a little over 1m from one another (Figure 4.84).

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Figure 4.82: Urns attributed to Vessel Group 13. Urn in this group are characterised by their angled lines in the Horizontal Zone, the use of two incised lines to border the decoration within the Horizontal Zone, and slightly curved chevrons in the Main Motif Zone. As these vessels are made of different ceramic fabrics they are likely to be the result of different potting occasions (Table 4.20). They were buried just 6m from one another (Figure 4.84).

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Figure 4.83: Urns attributed to Vessel Group 14. Urns in this group are characterised by the structure of their Horizontal Zones and the use of a crescent shaped stamp. Their Horizontal Zones are characterised by three incised lines at the top of the zone, followed by a band of upright and then a band of inverted stamps, and completed by two incised lines at the bottom of the zone. Both were buried c. 1.5m from one another and both belong to Phase 1 and both are made of the same ceramic fabric (Table 4.21 and Figure 4.84).

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Figure 4.84: Study Area 2 – the locations of urns attributed to Vessel Groups 11 (red), 12 (green), 13 (purple) and 14 (blue) (see Figures 4.81 to 4.83).

Urn Number	Classification	Earliest Phase	Latest Phase	Urn complex
84	09n	5	5	0
186	05s	1	1	48
188	07s	2	2	21
270	19n	4	5	0
279	22s	Un-phased	Un-phased	73
346	05s	1	2	0

Table 4.22: Urns decorated with segmented the circle stamp – Briscoe's A5f (Figure 4.85).

Urn Number	Classification	Earliest Phase	Latest Phase	Urn complex
208	10s	3	4	3
258	03s	1	3	0
259	10x	5	5	25
269	11s	5	5	0
285	22n	1	3	49
327	10s	4	4	39
349	18s	4	4	4
1086	10s	3	4	0
1097	02s	2	4	128

Table 4.23: Urns decorated with a variant of the segmented circle stamp – Briscoe's A5d (Figure 4.86).

A particularly interesting point regarding the urns in Study Area 2 is the apparent relationship between Vessel Groups 9 and 10; the urns in these groups are less than 2m apart and the majority belong to Leahy's Phases 3-4 (Tables 4.16 and 4.17 and Figures 4.76 to 4.79). Cross-shaped stamps are used to decorate urns belonging to both Vessel Groups. Both groups contain urns decorated with three-line chevrons, double rows of stamps and similar numbers of incised lines in the Horizontal Zone (in particular urns 259, 236, 273, 257, 1085). Everything suggests, then, that the potters who produced urns belonging to Vessel Groups 9 and 10 may have been aware of one another's work.

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Figure 4.85: Study Area 2 – the location of urns decorated with the segmented circle stamp with internal detail, categorised by Briscoe as A5f (example shown is from urn 279).

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Figure 4.86: Study Area 2 – the location of urns decorated with the segmented circle stamp, Briscoe's A5d (example shown is from urn 208).

Summary

By considering the personal idiosyncrasies of potters, in the way that they executed their urn decoration, it has been possible to putatively identify the works of a number of individual potters. Each of the urns that were identified as being the product of a specific individual were buried close together in the cemetery, suggesting that potters supplied individual household or families and that these households/families buried their dead in discrete plots. Given that potters seem to have favoured the use of specific types of stamps, but that the stamps seen on urns belonging to Vessel Groups do not derive from the same die, we can suggest that pottery was made on the basis of need (this agrees with Peacock's (1982, 8) observation that when pottery is manufactured by and for the consumption of the individual household, that production usually takes place on an 'as the need arises basis' – see Chapter 1).

Comparing the decoration of urns found in close proximity to one another demonstrates that that there are often similarities in the modes of decoration that would not be noticed if analysis focused purely on identifying the work of individual potters. For example, in the above discussion we saw that the urns belonging to Vessel Groups 1, 4 and 7 were all buried in close proximity to one another and that the potters responsible for these urns had a penchant for decorating their pottery with stamps and horizontal bands around the neck (Leahy's Group 02s mode of decoration). In contrast, the potters responsible for making the urns that belong to Vessel Groups 8, 11 and 14 – these urns were also buried within just a few metres of each other – favoured standing arched motifs as a mode of decoration. This suggests that potters were aware of the ways in which their immediate peer group were decorating their pottery, and that this awareness influenced their own pottery decoration. It also suggests that the dead were not just being buried in family, or perhaps household plots, but that they were also being buried in wider community groups.

Discussion

It is evident that the potters of early Anglo-Saxon England had a clear concept of the types of motifs that could be applied to pottery, the acceptable range of tools to be used to make these motifs, and how and in what order these motifs should be organised and applied to the vessel surface. Clearly, their pottery was produced according to culturally acceptable ideas and dispositions. Despite this overall conformity, however, differences in the way that designs are executed are observable, both within the cemeteries and between them. We have seen, for example, that the communities burying their dead at Elsham and Cleatham both made use of the same types of decoration. Yet, those at Cleatham more commonly decorated their urns with simple bands on incised lines around the necks or a band of incised lines around the neck that contained incised motifs (Leahy's Groups 02 and 03, respectively), whilst the communities using Elsham more frequently decorated their urns with groups of vertically incised lines (Leahy's Group 07a), standing arches (Leahy's Group 12a), and in particular, chevrons and stamps (Leahy's Group 10s).

When the distribution of types are considered throughout the cemeteries we begin to see clustering of motifs, demonstrating that particular elements of the early Anglo-Saxon community proliferated certain designs, whilst others did not. More importantly, it demonstrates that the potters whose urns are represented in these areas were probably aware of one another's work and that perhaps they may even have belonged to the same community of practice. This is demonstrated even more convincingly with the detailed analysis of urns in small areas of these cemeteries. In the analysis of Study Areas, for example, it was possible to show how the works of potters whose urns were buried within just a few metres of one another influenced and were in turn influenced by one other.

We must consider what factors contribute towards maintaining this overall homogeneity, and range of variation, and how they might have facilitated the development of regional styles and the later panel style stamp decoration. First of all we must accept that this was a new type of pottery, likely to have been introduced to Britain in the first instance by the migrants from northern Europe. These people may have brought vessels with them but it is likely that as they settled they begun to source raw materials and produce and use pottery in their own traditional ways. In the first instance, then, any new producer (be they native or migrant), would have to learn to pot by observing the incomers (once these traditions were adopted, however, 'teachers' need not be migrants). This may have been through a period of formal apprenticeship or through close observation. Indeed, as the ethnographic examples discussed above demonstrated, humans do not inherently know how to pot; the skills in forming, decorating and firing can only be attained through a period of tuition. It is impossible to know the relationship that existed between the teacher and student (for example, was it familial, patrilineal, matrilineal, or kin based?), or the form that this learning took. Given the level of consistency of decorative design and vessel form (see Chapter 3), however, it is clear that the apprenticeship or period of learning instilled the potters with a set of dispositions that dictated how they formed and decorated their vessels. As we have seen, these habits develop, are controlled, and maintained by communities of practice.

With this in mind we can begin to understand how the local and regional traditions developed. We have seen that the various communities that used the cemetery of Elsham made extensive use of Group 10s and 07a styles of decoration and we might suggest, then, that these site-specific preferences developed as a result of exposure to one another's work. This may have been a result of potters from the same, or proximal settlements, working together and sharing ideas and resources. As we have seen, learning is a continual process and does not stop after a formal period of apprenticeship. When potters work together in groups they are exposed to the work of their peers and as a consequence they may borrow and adapt other's designs and incorporate them into their own repertoires.

It is not hard to imagine, given the way in which decorated vessels appear to have been used prior to their burial (for the production and consumption of fermented produce, see Chapter 2), that they were highly visible objects within the home. Therefore, when fermented produce was manufactured or served, any visitor – whether from the settlement or beyond – would be able to view the decoration. Once more, such exposure may result in a level of borrowing, copying, adoption and innovation of ideas. It also encourages a consistent level of variation but overall homogeneity, be it at the household, familial, settlement, regional, or even national level. When one looks at the distribution of early Anglo-Saxon pottery finds sites in North Lincolnshire, which appear to suggest that the cemeteries lay at the centre of multiple communities (Figure 1.20 and 1.21) it is not hard to see how these potters, once exposed to one another's work, were able to develop and maintain their own local traditions.

That there was contact between potters beyond their own communities of practice is demonstrated by the works of the so-called Cleatham Daisy Grid and the Cleatham/Spong Hill potters (for details see Leahy 2007a, 114, 128). Leahy (2007a, 114) has already identified and discussed the Daisy Grid potter's work and a plot of this type within Cleatham reveals a relatively restricted distribution. There are outliers (Figure 4.87 and 4.88), however, and as the analysis above seems to suggest that burial was taking place in household and community plots, and that these outliers might suggests a level of exchange and thus contact between the individual communities using this cemetery. The current study has identified the same decorative style at Elsham (Figure 4.29) and this clearly demonstrates interaction between communities using both cemeteries. The Sancton/Baston and Sancton/Elkington (Leahy 2007a, 127-8) styles of pottery found at both these sites reaffirms this notion (see Figures 1.19 and 4.29). The occurrence of the two distinctive styles of decoration suggest that there was a level of contact with communities living beyond North Lincolnshire and this is further is evidenced by Cleatham urn 889, which is paralleled in Spong Hill, Norfolk (Figure 4.89). Whether this pot was made by a Spong Hill potter or is a 'copy' is unclear; either way it demonstrates that there was interaction between these two regions.[8] Such relations were probably responsible for maintaining the overall Anglo-Saxon style of decoration throughout the country.

Figure 4.87: Examples of urns attributed by Leahy (2007c) to the so-called 'Daisy-Grid Potter' (see Figure 4.88 for their burial locations within the Cleatham cemetery).

[8] Thin section analysis of this urn would help to answer such a question.

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Figure 4.88: The burial locations of urns attributed to the 'Daisy-Grid Potter' (see Figure 4.87). Note the outlier on the west of the cemetery, which perhaps represents a level of exchange between the different communities using this cemetery.

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Figure 4.89: Cleatham urn 889 and Spong Hill urn 1847 (Leahy 2007a, Fig 67).

Chapter 5

Find-spots and Fabrics

Introduction

In the previous chapter it was demonstrated that, whilst the pottery recovered from the cemeteries of Cleatham and Elsham was decorated in a similar fashion, certain types of decoration were more frequent at Cleatham, whilst others were more common at Elsham. By using Leahy's (2007a) system of decorative classification it was possible to show that specific types of decoration were concentrated in some areas of these cemeteries whilst they were largely absent from others. Furthermore, by considering minor aspects of decorative design, such as stamp types and the overall structure of decoration on individual urns, it was possible to demonstrate that the potters whose vessels had been buried close together were probably aware of one-another's work. These findings, it was suggested, resulted from potters working within communities of practice – a 'group of practitioners with a shared source of group identity' (Bowser 2008, 108) – and that the dead were probably being buried in community and family plots.

This chapter explores further the idea of communities, within both the cemeteries and the settlements that surround them. By examining in detail − both in hand specimen and in thin section − the fabrics of pottery recovered from these sites, it will be shown that the communities of practice in which pottery was manufactured influenced the types of fabric produced both at the level of the individual settlement and in different geographical areas of North Lincolnshire itself. By plotting the distributions of types of fabric and undertaking detailed petrographic analysis of samples of certain fabric types it will be shown that we can begin to relate specific settlements to the cemeteries in which their inhabitants buried their dead. In exploring these relationships we will begin to gain a greater understanding of the 'catchment areas' and 'territories' of the two cemeteries. However, before we look at the characteristics of early Anglo-Saxon pottery fabrics and the distributions of these types, it is pertinent to summarise some of the key observations concerning the mode of production of early Anglo-Saxon pottery and the technical choices made by early Anglo-Saxon potters.

In Chapter 1 detailed discussion was afforded to previous studies that have sought to understand the mode of production of early Anglo-Saxon pottery and in particular potters' choices of tempering materials. It was revealed that the early Anglo-Saxons were producing their pottery at a domestic level, for their own consumption. Their pottery was made, in most cases, of materials that were available within just a few miles of their settlements and, when made, their pottery did not travel very far from its point of production, if at all. Whilst a range of temper types were used by the Anglo-Saxon potters, there is a growing body of evidence that demonstrates that rather than being related to geological constraints, the choice of temper was a cultural one. Whilst plots of the distributions of fabric types over large regional areas are few, those that have been produced do demonstrate that the potters operating in different areas made use of specific temper types more than others. Furthermore, the examples of Sancton (Yorkshire), Mucking (Essex) and Lackford (Suffolk), do seem to suggest that the distributions of certain fabric types within cremation cemeteries might indicate the use of specific areas by different communities. Finally, as was revealed in Chapter 2, cremation urns do not appear to have been produced specifically for the funeral, rather, they were re-used domestic pots that in life fulfilled specialist functions (see also Perry 2011; 2012).

With the above observations in mind we can move forward to consider the final point of analysis in this thesis: whether we can identify examples of vessels in cemeteries that are, in terms of their fabrics and thus raw materials, identical to those from settlement sites. If so, given what we know of the scale of production and the largely limited extent to which pottery was moving through the landscape, it is possible that we can begin to relate individual settlements to specific cemeteries and, thus, gain a greater understanding of the catchment areas, or territories, which these cemeteries might have served. The following section, therefore, outlines the methodology undertaken in the classification of fabrics that will allow the distribution of fabric types to be investigated within North Lincolnshire in general, and the cemeteries of Elsham and Cleatham in particular, and how the relationships between specific settlements and cemeteries might be identified.

Methodology

Fabrics and Distributions

In order to consider the distributions of fabric types in the individual cemeteries of Elsham and Cleatham, and in the settlement sites that surround them, a standardised means of classifying the fabrics, known as a type-series, is required. Fortunately, the

East Midlands Anglo-Saxon Pottery Project (EMASPP), undertaken by Jane Young and Alan Vince in the early 1990s, provides us with such a means (Vince and Young 1991; 1992). Their project involved a regional survey and synthesis of major collections of Anglo-Saxon pottery in Derbyshire, Leicestershire, Lincolnshire and Nottinghamshire. Their survey determined that distinctive fabrics existed within these counties and accordingly they undertook 'to produce a Fabric series covering the major ... fabric groups' (Vince and Young 1991, 1). Each fabric group was classified according to the main mineralogical/tempering inclusions that they contained, leading to such descriptions as, for example, oolitic limestone-, sandstone- or vegetal-tempered pottery. Each of the fabric groups was then assigned an identifying name known as a Common Name − or Cname. For example, oolitic limestone-tempered fabrics are classified as LIM, sandstone-tempered fabrics as SST and vegetal-tempered fabrics as ECHAF (Young *et al.* 2005, 27-33; Young and Vince 2009, 392-4).

As the fabrics in Vince and Young's type-series are classified according to inclusions within the ceramic, it is a requirement that these inclusions are identified correctly. In order to ensure that this happened in the current study all sherds were examined using a x20 magnification binocular microscope and inclusions identified according to the criteria outlined in Orton *et al.*'s (1993, 236-7) '*Key to identification of inclusions in pottery*'. In a number of instances new types were identified (discussed further below). These newly identified fabrics were shown to Jane Young, Lincolnshire's leading Anglo-Saxon and medieval pottery specialist, and in accordance with Slowikowski *et al.* (2001, 10), the fabric of these types was fully described and added to the existing EMASPP type-series held by Jane Young.

Despite the large number of early Anglo-Saxon pottery find sites recorded in North Lincolnshire (see Chapter 1, in particular Figures 1.20 and 1.21), very few of these assemblages have been examined in detail to determine the types of fabrics present, and even those that have been examined have not necessarily been classified according to the EMASPP type-series (as discussed in Chapter 1, Leahy did not employ this type-series in his analysis of the Cleatham pottery). The few sites that had already been recorded in line with the type-series were not re-examined as part of the present study – such as South Ferriby (Vince 2005c) and West Halton (Perry 2009a). Instead, the data from the reports on these assemblages were incorporated into the current study. In accordance with Slowikoswki *et al*. (2001) the assemblages from each of the non-funerary find sites were quantified according to vessel count, sherd count and weight.

Although reference to specific assemblages of pottery from non-funerary find sites will be made through the following discussion, the quantity of data gathered in this stage of the analysis means that it is impractical to present the result from each individual site here; instead the results of fabric identifications and quantification are provided in Appendix D.1. The fabric data from the cemeteries of Elsham and Cleatham is provided in Appendix D.1.

Comparing Between Sites: Thin Section Analysis

A select programme of thin section analysis was undertaken in order to compare material from the settlement sites with that from the cemeteries, and thus potentially identify the settlements that might have been using individual cemeteries. Thin section petrography uses a polarising microscope to study thin slices (0.03mm thick) of pottery, mounted on glass slides. The method focuses on non-plastics (e.g. fragments of rock, minerals, crushed pottery, and organics such as grass, bone or shell) held in the clay matrix; these may occur naturally or they may result from the deliberate addition of material (temper). At this thickness many of the inclusions become translucent and, on the basis of their optical properties, they can be identified. Once identified it is often possible to determine the provenance of the raw materials and thus, by implication, the object. This is achieved through comparison with geological samples of clay and rock and/or consultation of geological maps and texts (Freestone 1995, 111; Orton *et al.* 1993, 140; Peterson 2009, 1; Vince 2005a, 220). No geological sampling was undertaken as part of this research; instead, the focus was on a detailed comparison of material from each of the sites, in order to match pots deriving from a common source in both settlement and cemetery contexts.

Minerals and rock types seen in thin section were identified using standard reference material such as Kerr (1977), Adams *et al.* (1994), Yardley *et al*. (1990), MacKenzie *et al.* (1993) and Adams and MacKenzie (1998) and interpretation was assisted by consultation of texts which focus on the geology of the area (for example, Gaunt *et al*. 1992; Wilson 1971; Swinnerton and Kent 1976; Kent 1980; Straw and Clayton 1979; and King 1976). A large amount of petrological work has already been undertaken on early Anglo-Saxon pottery (such as Brisbane 1980; Williams 1992; Russel 1984; Williams and Vince 1997; Ixer and Vince 2009), but as Vince (2005a, 226) noted, the majority has taken place on a site-by-site basis and as such the range and distribution of fabrics have not been sufficiently appreciated. Nevertheless, these works provide a large body of comparative data from which the current author draws heavily.

Thin section samples were grouped and described according to the methodology devised by Ian Whitbread (1989; 1995). Whilst this is not the method used by previous authors in their petrographic descriptions of early Anglo-Saxon pottery – these authors follow David Peacock (1968) –Whitbread's system was employed as it facilitates the production of extremely detailed descriptions that quantify and characterise mineralogical inclusions according to well-defined standards. His method forces the analyst to approach description in a systematic manner and at each step the analyst is made to comment on, and consider, the presence and absence of particular characteristics which provide insight into the way that the clay and temper were sourced and prepared and how the vessels were formed and fired. This rigour is something that is conspicuously lacking in petrographic study of Anglo-Saxon and medieval pottery. Indeed, in 2005 Vince (2005a, 223-4) himself emphasised the need for standardisation in the petrological analysis of such pottery, commenting that 'a major problem ... is the lack of any standardisation in the format of their published results' and that 'the traits in each thin section which are deemed worthy of describing also vary from report to report' (Vince 2005a, 233-4). It seems odd, then, that the merits of Whitbread's methods have been overlooked by petrologists studying British post-Roman pottery (who do not, in fact, even seem to acknowledge its existence), whilst it has been employed extensively by British, Greek and American petrologists studying material from outside of Britain, particularly that in the Aegean, for almost 20 years). Notably, in his 2005 call for standardisation, Vince did not even make reference to Whitbread's methods. As the current study is concerned with the subtle differences in ceramic fabric, which facilitate the identification of identical samples from settlement and cemetery contexts, a means of systematic recording that allows for the recognition of these differences is imperative; it was for this reason that Whitbread's method was employed.

Selection and Preparation of Thin Section Samples

The decision to take a sample of ceramic for thin section analysis was initially based on the fabric identification made at x20 magnification with a binocular microscope. A minimum sample of 10% was then taken of each of the fabric types from cemeteries. For some fabrics, the sample size was considerably higher and it is worth outlining the reasoning behind this. For example, North East Lincolnshire Greensand-tempered fabrics (NELESGS) were very common at Elsham (109 vessels), yet on the other hand only eight examples were recorded at Cleatham. Based on these proportions it seems likely that the raw materials used to make these fabric types were obtained from somewhere on the Lincolnshire Wolds, close to Elsham (this was proved correct by thin section analysis), and therefore that there was a distinct possibility that that Cleatham's NELESGS fabrics had been transported to Cleatham from a production site on the Wolds. So that this hypothesis could be tested, and sound comparisons drawn between the NELESGS fabrics from both cemeteries, the range of variation within this fabric at Elsham had to be fully understood; thus, eighteen samples were taken from Elsham (17%) and, for comparison, five from Cleatham (63%).

In the analysis of the non-funerary material, the decision to take a particular thin section was also based upon the fabric identification made with the binocular microscope. In total 111 thin sections were taken from the non-funerary find sites; this gives a 6% sample. Not all fabrics from each of the find sites were examined, nor were all find sites sampled. This decision was made on account of a variety of factors, including the condition of the pottery, size of the assemblage and the number of times that various sites had been investigated. For example, assemblages deriving from sites on the Humber Foreshore, such as Hoe Hill and Gox Hill, were not sampled because the material was well-abraded and covered in barnacles! Clearly these sherds had been affected by the waters of the Humber Estuary and there was no way of determining, with certainty, how they had arrived at the find site. Another factor that was taken in to account when selecting samples, was the fact that thin sectioning is a destructive process, and thus, no samples were taken from sites where the assemblages consisted of only a single sherd. Finally, a number of find sites have yielded early Anglo-Saxon pottery on different occasions and in order to achieve the broadest view of the material in the study area no multiple samples were taken of the same fabric found on different find events at the same place. For example, pottery has been recovered from a number of fieldwalking campaigns at Crosby Warren, and North Lincolnshire Museum and the HER subsequently assigned separate codes to finds made on these individual campaigns; for example, CRW for finds made at Crosby Warren and then a sub-code for the various find instance, such as CRWA, CRWB, CRWE (Table 1.4). The fabric type ECHAF (grass tempered pottery) was identified at CRWE and CRWB, but rather than take one grass tempered sherd from the assemblage of each find incident, just one sample was taken from CRWE; despite the multiple interventions at Crosby Warren, for present purposes, then, it was effectively regarded as a single site.

Once each sample for petrographic analysis had been selected, all thin sections were manufactured by the author in the Department of Archaeology, University of Sheffield. In total, 440 thin sections were made: 197 from Cleatham, 132 from Elsham and 111 from the non-funerary find sites. A full list of the samples taken, their EMASPP fabric-types, and the corresponding thin section petrographic groups to which they were assigned are provided in Appendix D.2. Following Whitbread's (1989; 1995) method, full descriptions of each petrographic group are also provided in Appendix D.2. With an understanding of the method of analysis we can now move to consider the results. The results are presented in the following format: the characteristics of each fabric-type, as classified according to the EMASPP type-series are presented; a discussion of the results of petrographic analysis are then provided; this is followed by accounts of the spatial distributions of each fabric type both in the individual cemeteries and within North Lincolnshire as a whole; finally, the identification of thin section samples from settlement and cemetery sites that are identical to one-another are discussed.[1]

Results

Early Anglo-Saxon Chaff-tempered Fabrics (ECHAF)

Early Anglo-Saxon Chaff-tempered fabrics (ECHAF) are characterised by abundant organic material added to the clay as temper (Young *et al.* 2005, 29-30). The organics are identifiable either as voids in the clay matrix, in which the structure of the plant remains are preserved, or preserved carbonised plant remains visible in the surface of a fresh break. Other inclusions are rare although grains of quartz sand are sometimes noted, and, less frequently, iron-rich pellets, fragments of sandstone, fragments of acid igneous rock and rare grains of well-rounded quartz.

Petrographic Analysis

In all samples, voids within the clay matrix still retained carbonised plant material, most likely grass, thus confirming the identification of organic materials recognised in hand specimen (Figure 5.3, see also Appendix D.2; Organics Group). That these materials

[1] At this point, the reader is urged to re-visit Figures 1.1, 1.20 and 1.21 to re-familiarise themselves with the topography of North Lincolnshire.

were added as temper, rather than occurring naturally in the clay, as plant roots, for example, is demonstrated by their standardised size and shape. As Rye (1981, 34) notes, such characteristics are not typical of naturally occurring organic materials. As the voids are rarely in excess of 2mm it is suggested that the grass was added to the clay in the form of dung, the short length of the blades being the result of chewing by animals.

Thin section analysis demonstrates that the potters producing this pottery made use of a range of clay sources, including possible Jurassic, alluvial/lacustrine, and boulder clays, all of which are available in the locality. Interestingly, potters appear to have preferred to use very fine clays; indeed, only three samples were identified as being manufactured using a course boulder clay, the rest were made using possible Jurassic and alluvial/lacustrine clays. This group of organic, or dung-tempered, pottery is intimately linked with the iron-pellet tempered fabric group (FE, see below). Indeed, the same clay preferences were apparent in the analysis of samples of FE and, in particular, a number of organic-tempered vessels also included iron-rich pellets, also added to the clay as temper.

Distribution within the Study Area and the Cemeteries of Elsham and Cleatham

ECHAF pottery is almost entirely absent from sites east of the River Ancholme, including Elsham, but it is found extensively on sites to the west of the river, in particular those around Cleatham and the Cleatham cemetery itself (Figure 5.1 and Table 5.1). Unlike other forms of temper – such as limestone or iron-rich pellets deriving from iron-pan deposits − dung and grass would be readily available to potters on both sides of the river. Therefore, raw material availability cannot account for this pattern of distribution and it would appear that this is a specific cultural difference between the communities living on either side of the River Ancholme. Within the cemeteries themselves further distribution patterns are evident. Although few ECHAF urns were identified at Elsham, all but one of these urns were buried in the western half of the cemetery (Figure 5.2), whilst at Cleatham, ECHAF urns are largely restricted to the northern area of the cemetery, and in particular they are concentrated along its north-eastern edge (Figure 5.2). These distributions suggest the use of certain areas of these cemeteries by different communities.

As the temper in these samples is ultimately vegetation, we must be wary of suggesting that identical samples found at more than one site actually derive from a common source. However, when samples are considered in light of the archaeological evidence – that most ECHAF vessels occur on sites west of the River Ancholme, and in particular around the cemetery of Cleatham – we can be more confident in identifying instances where samples might derive from a common source. For example, sample GP095 derives from Scotton (SNAC); the clay background in this sample is identical to that in samples MT111, MT125 and MT131 from Cleatham (Figure 5.3). As Cleatham is just 4km from Scotton (Figure 5.1), it is quite likely that these four samples have a common source. The clay background seen in sample GP075, from Manton Warren (MTBX), which is just 3km north of Cleatham, is identical to that of MT126 (from Cleatham), whilst samples GP015 and GP043, from Bagmoor (BSAE), are also identical to a number of samples from Cleatham (Appendix D.2; Organics Group). For these examples, then, we see that we can match pottery from settlement sites, located around a single cemetery, with pottery from that cemetery. The recognition of this pattern makes the following relationship even more significant; the fabrics of samples ELAJ069, GP075 and MT126, which derive from Elsham, Manton Warren and Cleatham, respectively, are identical to one-another. It is quite clear, then, that this Elsham sample (ELAJ069) was produced using the same raw materials used to make pottery found in the locality of Cleatham. We must ask, then, were potters from the sites around Elsham exploiting the same raw materials as those around Cleatham, or is this an example of a pot that has been transported over a considerable distance? This issue will be discussed later in the chapter, when other examples of potentially transported pots have been identified will also be considered.

Fabric Cname	Number of Elsham Urns	% Elsham	Number of Cleatham Urns	% Cleatham
ASQSH	1	0.2%	3	0.3%
ASSH	0	0.0%	4	0.4%
ASSHQ	4	0.6%	5	0.5%
CHARN	58	9.3%	96	10.0%
ECHAF	6	1.0%	60	6.3%
ELCHARNLOC	10	1.6%	1	0.1%
ELFEOL	1	0.2%	0	0.0%
ELQFE	3	0.5%	0	0.0%
ERRA	8	1.3%	1	0.1%
ESAXLOC	30	4.8%	72	7.5%
ESGS	1	0.2%	10	1.0%
ESGSNL	1	0.2%	13	1.4%
ESMG	99	15.9%	34	3.5%
FE	25	4.0%	157	16.4%
LIM	9	1.4%	30	3.1%
LIMES	10	1.6%	34	3.5%
NELESGS	109	17.5%	7	0.7%
SST	132	21.2%	341	35.6%
SSTCAC	41	6.6%	5	0.5%
SSTFEC	60	9.6%	36	3.8%
SSTMG	8	1.3%	18	1.9%
SSTNL	0	0.0%	16	1.7%

Table 5.1: Proportions of the various fabric types of urns found at the cemeteries of Elsham and Cleatham.

Figure 5.1: The distribution of ECHAF find sites in North Lincolnshire.

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Figure 5.2: The distribution of ECHAF fabrics within the cemeteries of Elsham and Cleatham (for comparison, the distribution of FE fabrics at Cleatham is also shown here – see Figure 5.5 for detail of area highlighted by green box).

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Figure 5.3: Photomicrographs of the ceramic fabric of samples from settlement and cemetery sites. The fabrics of samples GP095 and MT131 are identical, as are those of GP075, MT126 and ELAJ069. See Figure 5.1 for the locations of relevant sites. (Images take in cross-polarised light, image width 3.5mm.)

Iron-pellet Tempered Fabrics (FE)

Iron-pellet tempered fabrics are characterised by their main tempering agent of coarse, angular to rounded ferrous pellets. Fabrics may also include quartz grains, organic inclusions (represented as either voids or carbonised material), sandstone, igneous rocks and limestone fragments (Young and Vince 2009, 347).

Petrographic Analysis

In thin section the iron-rich inclusions are opaque and are commonly sub-round to sub-angular but very rarely angular. The rounding of these grains suggests that these inclusions are unlikely to have been crushed before being added to the clay as temper. Iron-pellets are a relatively common mode of tempering in early Anglo-Saxon pottery and have been noted in pottery from settlements and cemeteries alike (Young and Vince 2009, 347). Vince (2003a, 9; 2004, 6-9, 15) described the pellets in detail in his petrographic analysis of pottery from the cemetery of Sancton (Yorkshire) and the settlement at Brough (Nottinghamshire). He concluded that the pellets are likely to derive from an iron-pan or an iron ore deposit, such as the Northampton Sands.

Although he did not undertake any thin section analysis, Leahy thought that the iron-pellets in the Cleatham urns were likely to be metal-working slag that had been crushed and added to the clay as temper (Leahy 2007a, 7, 227). Whilst slag tempering is certainly known in the Anglo-Saxon period, at West Heslerton and Sancton, for example (Vince 2004; Vince n.d.), this practice is rare. Slag tempering is identified in thin section by the presence of fayalite (a by-product of iron-working), and angular opaque fragments that develop from the act of crushing. None of these characteristics were, however, present in any of the thin sections sampled for this thesis, and so Leahy’s suggestion about the possible use of metal-working slag can be discarded. It is likely, then, that the ferruginous inclusions in these samples, like those from Brough (Vince 2003a, 9), derive from an iron-pan deposit. It is encouraging to find that the ferruginous iron-pan forming Northampton Sand and the Pecten Ironstone crop out within 4km of Cleatham, and although not known in exposure close to the site, the Frodingham Ironstone and iron-pan forming Thorncroft Sands constitute the underlying bedrock (Gaunt *et al.* 1992, 34-6, 53-4, 40-5).

Figure 5.4: The distribution of FE find sites in North Lincolnshire with respect to iron-rich geological deposits.

Figure 5.5: The distribution of FE fabrics within the cemetery of Elsham (bottom) and a detail of the distribution of FE and ECHAF fabrics at Cleatham (top) (see Figure 5.2 for location of detail).

Figure 5.6 (continued overleaf): Photomicrographs of the ceramic fabric of samples of the Cleatham Ironstone Petrographic Group from settlement and cemetery sites. The fabrics of samples GP022, GP084, GP085, GP094, MT106, MT108, MT110 and MT112 are identical, as are those of MT116 and ELAJ086. See Figure 5.4 for the locations of relevant sites. (Images taken in cross-polarised light, image width 3.5mm.)

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Figure 5.6 (continued from previous page): Photomicrographs of the ceramic fabric of samples of the Cleatham Ironstone Petrographic Group from settlement and cemetery sites. The fabrics of samples GP022, GP084, GP085, GP094, MT106, MT108, MT110 and MT112 are identical, as are those of MT116 and ELAJ086. See Figure 5.4 for the locations of relevant sites. (Images taken in cross-polarised light, image width 3.5mm.)

Thin section analysis demonstrates that these iron-pellets were added to a number of clay types, with potters mainly utilising silty clays, and fine, near inclusionless, clays (probably Jurassic), although boulder clays were also used (see Appendix D.2; Cleatham Ironstone Group). The range of accessory minerals that were noted in hand specimen was confirmed in this section, including igneous rock fragments, limestone, sandstones, calcareous sandstones and chert. These inclusions are unlikely to have been deliberately added; rather, they were restricted to the instances where boulder clays were used. The small number of FE urns that were identified at Elsham were seen in thin section to contain a range of accessory minerals that suggest that they were made using raw materials found on the Lincolnshire Wolds, and thus close to Elsham (see Appendix D.2; Cleatham Ironstone Petrographic Group).

Distribution within the Study Area and the Cemeteries of Elsham and Cleatham

The majority of settlements where FE fabrics were identified were located to the west of the River Ancholme and, in particular, along – or within a few kilometres of – the iron-pan forming Thorncroft and Northampton Sands and the ferruginous Frodingham and Pecten Ironstone members (Figure 5.4). As the thin section analysis demonstrates that the iron-rich materials most likely derive from iron-pan deposits, the geographical distribution of this fabric type in the north of the county accords completely with the local geology. This distribution is mirrored in the cemetery assemblages, with FE fabrics being common at Cleatham but rare at Elsham (Table 5.1). Little can be said about the distribution of FE fabrics within the cemetery of Elsham, other than that, with the exception of a small band that runs north-east from the centre of the cemetery, FE urns are relatively evenly distributed across the whole site (Figure 5.5). At Cleatham, where FE fabrics were used extensively, FE urns are widely distributed across the site, but occur more frequently, and concentrate in the north of the cemetery (Figures 5.2 and 5.5).

Settlement and Cemetery Relationships

Although thin section analysis demonstrates that the majority of Elsham's FE fabrics were produced on the Wolds (see Appendix D.2; Cleatham Ironstone Petrographic Group), this was not always the case. Samples MT116 and ELAJ086 (from Cleatham and Elsham, respectively, Figure 5.6) were produced using exactly the same set of raw materials. As these raw materials are characteristic of geological formations from west of the River Ancholme, close to Cleatham, the fabric of sample ELAJ086 was either manufactured close to Cleatham and then transported across the river and buried at Elsham, or else potters living close to Elsham travelled over long distances to obtain their raw materials for potting.

Not only did thin section analysis allow links to be identified between the two cemeteries, it also allowed the identification of pottery recovered from non-funerary sites which is petrographically identical to samples obtained from the cemetery of Cleatham (Figure 5.6). Like the organic tempered group (ECHAF), the majority of non-funerary sites from which the fabric of FE samples have been identified as being identical to the fabric of Cleatham samples lie within a few kilometres of Cleatham (Scotton and Manton Warren, SNAC and MTBX), but the fact that the fabric of sample GP022, from Melton Ross (MRBF), is also identical to the fabric of samples from Cleatham further demonstrates that some potters were travelling over long distances to obtain their raw materials or that a small amount of pottery was moving through the North Lincolnshire landscape (Figure 5.4).

Early Anglo-Saxon Mixed Sandstone 'Greensand' Fabrics (ESMG)

Early Anglo-Saxon Mixed Sandstone 'Greensand' fabrics (ESMG) are characterised by fragments of calcareous cemented sandstone and medium to granular well-rounded water polished quartz (known colloquially as 'greensand' quartz) and chert, which were all added to the clay as temper. Fabrics also contain a range of accessory inclusions such as red-black iron ooliths, limestone, and oolitic limestone. This fabric type was newly identified in this study; this is surprising, given how prevalent the fabric appears to have been in North Lincolnshire.

Petrographic Analysis

In thin section this fabric type is characterised by fragments of calcareous sandstone and coarse (up to 2.5mm) grains of sub-rounded to well-rounded quartz and chert (see Appendix D.2; Calcareous Sandstone and Coarse Well Rounded Quartz and Chert Group). The sandstone is composed of poorly sorted medium sand to granular sub-angular to well-rounded quartz, chert (often chalcedonic), microcline feldspar, polycrystalline quartz are rarely glauconite. Quartz grains show strain shadows, possess vacuoles, and rarely rutile and zircon, and are commonly traversed by micro-fractures. Such mineralogy is characteristic of the Spilsby Sandstone, which crops out c. 5km south of Barnetby-le-Wold and c. 6km south of Melton Ross (Gaunt *et al.* 1992, 69). Thin section analysis also confirmed the hand specimen identification of oolitic ironstone. These highly distinctive inclusions are characteristic of the Claxby Ironstone, which crops out along the Wolds edge and overlays the Spilsby Sandstone. Notably, the Claxby Ironstone weathers to form clayey soils which contain conspicuous ooliths (Gaunt *et al.* 1992, 71-3). The mineralogy of these samples is, therefore, wholly consistent with the geology close to Elsham.

ESMG fabrics were also identified at Cleatham and a number of sites to the west of the River Ancholme (Figure 5.7). A key question, then, was were the western vessels products of the Lincolnshire Wolds that had been transported across the river, or were they produced using a calcareous sandstone with similar characteristics located on the western bank of the River Ancholme? Petrology demonstrates that it is probably a combination of both processes. A small number of samples have their origins on the Lincolnshire Wolds, whilst the majority derive from geology west of the River Ancholme.

In thin section, the samples identified as being produced west of the River Ancholme, and therefore close to Cleatham, contained coarse, rounded grains of quartz and chert up to 1.0mm in diameter. However, they were lacking the very coarse (up to 2.5mm) grains of quartz, chert, and chalcedonic chert, and oolitic ironstone, all of which are present in, and characterise, those samples with an origin on the Lincolnshire Wolds. The western samples also include an additional biosparite component, absent from the Elsham samples. Indeed, samples attributed to this western group included fragments of biosparite which contained one or more of the following: brachiopods, gastropods, crinoids, and calcite ooliths formed around shell fragments. Such fauna is present in the limestones that form the Lincolnshire Limestone (see below), and thus support the conclusion that the raw materials were obtained from west of the River Ancholme, close to Cleatham.

As the samples attributed to the western group do not contain the mineralogy characteristic of the Spilsby Sandstone, they should be reclassified as SSTCAC – i.e. tempered with calcareous sandstone, rather than, specifically, the Spilsby Sandstone. The origins of these samples are, therefore, discussed along with the other SSTCAC fabrics (below and Appendix D.2; Cleatham Calcareous Sandstone Group). As the pottery produced on both the east and west sides of the River Ancholme is very similar in hand specimen, the differences between them can only be truly appreciated in thin section. This demonstrates that it is not enough to simply undertake hand specimen identification of early Anglo-Saxon pottery.

Frequency and Distribution within the Study Area and the Cemeteries of Elsham and Cleatham

ESMG fabrics accounted for 16% of the Elsham assemblage, but less than 4% (including the misidentified samples) of the Cleatham urns (Table 5.1). This conforms to the geology of the county, with the Spilsby Sandstone being on the east side of the River Ancholme and close to Elsham and its surrounding settlements (Figure 5.7).

Whilst being distributed across the cemetery of Elsham, ESMG fabrics are more common in the western half of the cemetery, and, in particular, they are frequent in the ditch (Figure 5.8). Notably, this distribution follows that of the NELESGS fabrics, which, as petrographic analysis demonstrates, are tempered with the decalcified detritus of the Spilsby Sandstone (see NELESGS below and Appendix D.2; Coarse Well Rounded Quartz and Chert Group).

At Cleatham, urns identified as being made of ESMG fabrics also focus on the western side of the cemetery (Figure 5.8). This distribution is extremely interesting as it demonstrates that a number of potters supplying the urns to the community burying their dead in this area were exploiting the same raw materials as one another, but different from the other communities that were burying their dead at Cleatham. Petrographic analysis demonstrates that whilst the majority of urns in this small concentration of ESMG urns on the western side of the Cleatham cemetery are likely to have been produced using raw materials that were available in the immediate vicinity of Cleatham, a small number were made from raw materials obtained on the east of the River Ancholme, close to Elsham (urns 488 and 492 – thin section samples MT091 and MT092 – are likely to have been produced using raw materials obtained from close to Elsham).

Settlement and Cemetery Relationships

The fabric of sample GP033 from Melton Ross (MRBF) is demonstrably the same as the fabric of sample ELAJ122 from Elsham; Melton Ross is just c. 3km from Elsham. Intriguingly, the fabric of sample GP025, from Melton Ross (MRBF), was identified as being identical to that of sample GP006 from Barton-upon-Humber (BNAM) (Figures 5.7 and 5.9). The recognition that the fabrics of these samples are identical clearly reiterates the point that it is possible to identify settlements and cemeteries that contain pots deriving from a common source, whilst the link between Barton-upon-Humber and Melton Ross appears to suggest that some pots were being transported over distances in the region of 20km, or else potters were prepared to travel such distances to obtain the raw materials for potting. These alternatives will be discussed below.

Figure 5.7: The distribution of ESMG find-sites in North Lincolnshire in relation to the location of the Spilsby Sandstone, the source of the tempering materials found in the ESMG fabric.

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Figure 5.8: The distribution of ESMG fabrics within the cemeteries of Elsham and Cleatham. Note that the distribution of this fabric type is densest on the western sides of each of the cemeteries and in particular, this fabric is extremely common in the ditch at Elsham.

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Figure 5.9: Photomicrographs of the ceramic fabric of samples of the Calcareous Sandstone and Coarse Well Rounded Quartz and Chert Group from settlement and cemetery sites. The fabrics of samples GP006 and GP025 are identical, as are GP033 and ELAJ122. See Figure 5.7 for the locations of relevant sites. (Images taken in cross-polarised light, image width 3.5mm.)

Early Anglo-Saxon Calcareous Cemented Sandstone Fabrics (SSTCAC)

Early Anglo-Saxon Calcareous Cemented Sandstone fabrics (SSTCAC) are characterised by medium grained sub-angular to well-rounded quartz grains, which clearly derive from fragments of calcareous cemented sandstone that are present in the fabric. Samples may also contain limestone fragments, non-calcareous sandstones, and igneous erratics. Like the ESMG fabrics discussed above, this is a previously unidentified fabric type.

Petrographic Analysis

Petrographic analysis suggests that a number of sources of calcareous sandstone were being exploited for use as temper. The sandstones in the SSTCAC samples examined from the cemetery of Cleatham are characterised by fine to medium grained, rarely coarse grained quartz in a calcite cement (Figure 5.12) (see Appendix D.2; Cleatham Calcareous Sandstone Group). These are frequently accompanied by fragments of fossiliferous limestone, comprising brachiopods, gastropods and crinoids, or less frequently, ooliths deriving from oolitic limestone. Those from Elsham, on the other hand, are characterised by medium to coarse grained quartz in a calcite cement, and they lack the limestone inclusions that were present in the Cleatham samples (Figure 5.12) (see Appendix D.2; Elsham Calcareous Sandstone Group). In both cases, however, the angularity of the calcareous sandstone fragments demonstrates that the potters were crushing the rock before adding it to the clay. A further similarity between these two groups is the fact that the potters on either side of the River Ancholme were utilising boulder clays.

The suite of calcareous material noted in the Cleatham samples can be accounted for by a number of geological formations in the locality of Cleatham (Figure 5.11). These include the Ravensthorpe Beds, which contain the Elleker Limestone, the Kellaways Rock Member, the Cornbrash Formation and the Marlstone Rock Member, all of which are exposed at various points along the edge of the Lincolnshire Limestone. In particular, both the Cornbrash Formation and the Kellaways rock crop out at Hibaldstow, just 3km east of Cleatham (Gaunt *et al.* 1992, 40-62). The homogeneity of the Cleatham group, however, is such that the potters were more than likely exploiting just one of these potential sources.

Vince (Vince 2005b) examined a calcareous sandstone tempered sherd from Barnetby-le-Wold and suggested that the sandstone probably derived from a formation located on the Lincolnshire Wolds. Gaunt *et al.* (1992, 66) have described the Elsham Sandstone, which crops out on the Wolds' edge, close to Elsham, and specifically at Barnetby-le-Wold, as medium to coarse grained, moderately to poorly sorted and comprising sub-angular to rarely rounded loosely to closely compacted in an argillaceous or calcareous matrix (Figure 5.11). These characteristics are entirely consistent with the character of the calcareous sandstone seen in samples deriving from Elsham and the non-funerary sites surrounding it. It seems likely, thus, that this formation provides the raw materials for tempering this group.

Distribution within the Study Area and the Cemeteries of Elsham and Cleatham

At Cleatham very few urns were identified as SSTCAC (Figure 5.10 – also see Figure 5.8 which shows the distribution of Cleatham's ESMG fabrics which should be re-classified as SSTCAC) and these are randomly distributed across the site. In contrast to Cleatham, there are clear patterns in the distribution of SSTCAC urns at Elsham (Figure 5.10). A band of SSTCAC urns runs along the south-eastern edge of the cemetery and this distribution becomes even more convincing when compared to the distribution of pottery tempered with acid igneous rocks (CHARN, see below) (Figure 5.20). Indeed, on the eastern side of the cemetery, urns made of acid igneous tempered fabrics occupy the areas where calcareous sandstone tempered fabrics (SSTCAC) are absent, and vice versa.

Few SSTCAC vessels were identified on non-funerary sites west of the River Ancholme – this is consistent with the general lack of SSTCAC fabrics at Cleatham. In contrast, on the eastern bank of the River Ancholme, where Elsham is located, SSTAC vessels are numerous. The largest assemblage of SSTCAC vessels derives from Melton Ross (MRBD), a site that is just a few kilometres from Elsham (Figure 5.11). As the Elsham Sandstone, the probable source of this temper, crops out around Elsham and Barnetby-le-Wold (Gaunt *et al.* 1992, 66), the mineralogy of these samples can be readily accounted for in the geology in the locality of the sites from which these samples were obtained.

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Figure 5.10: The distribution of SSTCAC fabrics within the cemeteries of Elsham and Cleatham. Note that at Elsham the distribution of this fabric type forms a crescent shape along the south and eastern edge of the cemetery.

Figure 5.11: The distribution of SSTCAC find-sites in North Lincolnshire and the location of geological formations which contain calcareous sandstones.

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Figure 5.12: Photomicrographs of the ceramic fabric of samples of the Cleatham Calcareous Sandstone Petrographic Group (GP021 and MT090) and the Elsham Calcareous Sandstone Petrographic Group (GP032, ELAJ129 and ELAJ130). The fabrics of samples GP021 and MT090 are identical, as are GP032, ELAJ129 and ELAJ130. See Figure 5.11 for the locations of relevant sites. (Images taken in cross-polarised light, image width 3.5mm.)

Settlement and Cemetery Relationships

Although none of the fabrics of Cleatham samples were identical to any of the samples from Elsham, it was possible to identify samples of fabrics deriving from non-funerary find sites that were identical to samples from the cemeteries. For example, the fabric of sample MT090 from Cleatham was identical to that of GP021 from Hibaldstow (Figure 5.12); Hibaldstow is just c.3km north-east of Cleatham (both these samples were tempered with a calcareous sandstone that derives from west of the River Ancholme and they also include iron-opaques, probably deriving from an iron-pan deposit) (Figure 5.11). On the Wolds, the fabric of sample GP032, from Melton Ross (MRBD) was identical to that of samples ELAJ129 and ELAJ130 from Elsham – these three samples are tempered with the Elsham Sandstone; notably Melton Ross is just c.3km south-east of Elsham (Figure 5.11 and 5.12).

North East Lincolnshire Greensand Tempered Fabrics (NELESGS)

North East Lincolnshire Greensand Tempered Fabrics (NELESGS) are characterised by the presence of medium to coarse well-rounded quartz grains, coarse 'greensand' quartz, and very coarse well-rounded chert. The fabrics also contain iron ooliths in the clay background. Like the ESMG fabrics (above), this fabric type was newly identified by this study.

Petrographic Analysis

NELESGS fabrics were noted on a number of sites throughout the study area (Figure 5.12). In thin section it was possible to separate these into two petrographic groups, one which represents NELSGS from east of the River Ancholme and one from the west (Appendix D.2; Very Coarse Grained Well-Rounded Quartz and Chert Petrographic Group and the Cleatham Well Rounded Quartz and Chert Petrographic Group, respectively), although samples were identified to the west of the River Ancholme, which do have a Wolds origin. The most striking thing about the samples of this Wolds derived petrographic group was the fact that, but for the lack of calcite, the mineralogy is exactly the same as the ESMG fabrics. It is suggested, then, that this very coarse sand, composed of well-rounded polycrystalline and monocrystalline quartz (with inclusions of rutile and zircon), chert and chalcedonic chert (up to 2.5mm in diameter), were added to the clay as temper and that this sand is the decalcified detritus from the Spilsby Sandstone. The iron-rich ooliths and the glauconite, characteristic of the ESMG samples, are also present in this group; as noted previously, these ooliths are likely to derive from the Claxby Ironstone, which overlays the Spilsby Sandstone (Gaunt *et al.* 1992, 71-3).

The western petrographic group, that is those samples that were identified as containing mineralogy deriving from west of the River Ancholme (the Cleatham Well Rounded Quartz and Chert Group, see Appendix D.2), which contains only samples from Cleatham, is separable from the eastern group on account of the size of the quartz and chert grains (the coarsest grains in the former group are roughly half the size of those in the latter) and the absence of glauconite, chalcedony, oolitic ironstone and the zircon and rutile bearing quartz grains (Appendix D.2; Very Coarse Grained Well-Rounded Quartz and Chert Group and the Cleatham Well Rounded Quartz and Chert Group). The well-rounded grains in the samples belonging to the western petrographic group suggest that the sand from which these grains derive are water transported and it is likely that they derive from a river sand. Despite these differences in temper, both the eastern and western petrographic groups were produced using boulder clays. This is demonstrated by the range of accessory minerals and lithic clasts, including amphibole, sandstone, muscovite mica, and very weathered orthoclase, plagioclase and microcline feldspars.

Distribution within the Study Area and the Cemeteries of Elsham and Cleatham

NELESGS fabrics were the second most common fabric type at Elsham, but they accounted for less than 1% of the Cleatham assemblage (Table 5.1). In accordance with the proportions of this fabric in the cemeteries, the distribution of NELESGS fabrics is biased towards sites on the Wolds, closer to Elsham than Cleatham. Indeed, the largest assemblages of this fabric type were noted at Caistor (CAAG) and Melton Ross (MRBD), both of which are located on the Lincolnshire Wolds. Notably Melton Ross is around 3km from Elsham, whilst Caistor, which lies on the Spilsby Sandstone, is c.13km south of Elsham. As the suggested raw material sources outcrop along the World’s edge, this distribution accords with the geology of the county (Figure 5.13).

Figure 5.13: The distribution of NELESGS find-sites in North Lincolnshire, with respect to the location of the Spilsby Sandstone, the source of the lithologies present in NELESGS fabrics.

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Figure 5.14: The distribution of NELESGS fabrics within the cemetery of Elsham. Note that the distribution replicates that of the ESMG fabric type (Figure 5.8).

Considering the distribution of NELESGS within the cemeteries themselves reveals that at Elsham the distribution of NELESGS is almost identical to the distribution of ESMG urns (Figures 5.14 and 5.8). This is encouraging, given that it has been suggested here that the sand in Elsham's NELESGS urns are the decalcified detritus of the Spilsby Sandstone − the source of the calcareous sandstone noted in the ESMG fabrics. At Cleatham, very few NELESGS urns were identified and these are randomly distributed across the site.

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Figure 5.15 (continued on next page): Photomicrographs of the ceramic fabric of samples of the Coarse Well Rounded Quartz and Chert Petrographic Group. The fabrics of samples GP039, GP040, GP093, ELAJ013 and ELAJ116 are identical, as are those of samples GP087 and ELAJ018. Note the characteristic iron ooliths – spherical opaques. See Figure 5.13for the locations of relevant sites. (Images taken in cross-polarised light, image width 3.5mm.)

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Figure 5.15 (continued): Photomicrographs of the ceramic fabric of samples of the Coarse Well Rounded Quartz and Chert Petrographic Group. The fabrics of samples GP039, GP040, GP093, ELAJ013 and ELAJ116 are identical, as are those of samples GP087 and ELAJ018 (the difference in colour of fabric is simply the result of oxygen availability during firing). See Figure 5.13for the locations of relevant sites. (Images taken in cross-polarised light, image width 3.5mm.)

Settlement and Cemetery Relationships

Although none of the Cleatham NELESGS samples that were examined in thin section were identical to samples from Elsham, it has been possible to match a number of samples taken from the non-funerary finds sites with samples from the cemeteries. The fabrics of samples GP039 and GP040 from Melton Ross are identical to that of samples ELAJ013 and ELAJ116 from Elsham (Figure 5.15) and GP093 from Scotton (SNAC), and the fabric of a sample from Manton Warren, Manton (MTBX, sample GP087), is identical to that of sample ELAJ018 from Elsham. Given that Melton Ross (MRBF) is just c. 3km from Elsham it is not surprising that this ceramic link between a cemetery and neighbouring settlement was identified (Figure 5.13). However, the links between samples from Elsham, Scotton and Manton Warren are interesting because of the distance between these sites – Manton Warren is c. 14km from Elsham, whilst Scotton is c. 20km away. From their mineralogy, it is quite clear that the Manton Warren and the Scotton samples were made from raw materials that were obtained on the Wolds. This tells us that the Scotton and Manton Warren samples either derive from pots that were made close to Elsham and then transported westwards, across the River Ancholme to the sites where they were recovered archaeologically, or else potters from Scotton and Manton Warren were travelling long distances to obtain the raw materials for potting. These two possibilities will be discussed later in the chapter.

Anglo-Saxon Shell-tempered Fabrics (ASSH), Anglo-Saxon Shell and Quartz-tempered Fabrics (ASSHQ), and Anglo-Saxon Quartz and Shell-tempered Fabrics (ASQSH)

These three fabric types, ASSH, ASSHQ and ASQSH are characterised by shell inclusions, which are clearly visible in fresh sherd breaks; they are separable from one another, however, on account of their quartz content. ASSH sherds have little or no visible quartz, ASSHQ sherds have sparse quartz inclusions, whilst in ASQSH sherds the quartz dominates over the shell (Young 2000).

Petrographic Analysis

Samples of each of the three fabric types were examined in thin section: three ASQSH samples (two from Cleatham and one from Elsham), two ASSH (both from Cleatham) and five ASSHQ (two from Cleatham three from Elsham). In all but one instance the shells were identified as belonging to brachiopods and derive from fossiliferous limestone that was crushed and added to the clay as temper (the exception was sample ELAJ105 from Elsham, identified as ASSHQ, in which the shell, also brachiopods, was seen to derive from a fossil-shell bearing sand). This is consistent with Vince's (2002a, 3) analysis of ASSHQ sherds from Dunholme (Lincolnshire), which demonstrated that shell fragments derive from limestone rather than fresh shell. For this reason, samples analysed in this thesis were placed in the Limestone Petrographic Group (see Appendix D.2) and are discussed fully in the section on Limestone-tempered fabrics, below.

Petrographic analysis demonstrates that the varying proportions of quartz grains, which have been used to differentiate between the ASSH, ASQSH and ASSHQ hand specimen samples, are largely a result of the clay to which this fossiliferous limestone was added. In sample ELAJ104 (ASSH), for example, the shell fragments were added to a silty clay in which no quartz grains greater than medium to coarse silt were noted, whilst in sample MT018 (ASQSH) the shell fragments were added to a boulder clay which contained weathered, rounded, coarse grained plutonic igneous rock fragments. This tells us that although the potters responsible for making these vessels added fossil-shell to their clay, the clay sources that they used were different. It is, therefore, worthwhile distinguishing ASSH from ASHSQ and ASQSH in hand specimen as doing so tells us about the potters' raw material choices. In contrast, petrographic analysis suggests that there is, perhaps, little point in attempting a differentiation between ASSHQ and ASQSH (i.e. shell and quartz and quartz and shell) as the variation in the frequency of quartz sand is likely to be due to natural variability within the clay or temper. Indeed, sample ELAJ105 was attributed to the ASSHQ hand specimen group, but thin section analysis demonstrates that both the quartz and shell derive from a single sand deposit that was added to the clay as temper. There is little point attempting to determine whether the shell is more common than the quartz, and thus classifying the fabric of the sherd as either ASSHQ (more shell), or ASQSH (more quartz), when both the shell and quartz are a constituent of a single sand used to temper the clay.

Frequency and Distribution within the Study Area and the Cemeteries of Elsham and Cleatham

None of the three fabric types (ASSH, ASQSH, and ASSHQ) were evident in large proportions at either of the cemeteries. Indeed, cumulatively, they account for just 1.2% and 0.8% of the urn assemblages of Cleatham and Elsham, respectively (Table 5.1). With such small numbers it is difficult to identify distribution patterns, although it can be said that at Cleatham, whilst there is no clear pattern, where these fabrics do occur they are generally found adjacent to urns made of other limestone related fabrics (e.g. LIM, LIMES, ESMG, SSTCAC). It is suggested, then, that potters were not specifically selecting shelly limestones over other limestones, they were probably just selecting limestone as temper, and the frequency of shell was merely a consequence of natural variability within the limestone.

Within the broader North Lincolnshire study area, all three types ASSHQ, ASSH, ASQSH are seen to occur most frequently on the western bank of the River Ancholme (Figure 5.16). This location is precisely where the Lincolnshire Limestone is to be found – the source of fossiliferous limestone in the broader Limestone (LIMES) and Oolitic Limestone (LIM) fabrics (see LIMES and LIM discussion below) – and, therefore, the distribution of these types follow the geology of the study area.

Settlement and Cemetery Relationships

With so few samples of these fabric types it was not possible to identify identical samples deriving from more than one site.

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Figure 5.16: The distribution of ASSH, ASQSH and ASSHQ find-sites in North Lincolnshire (see Figure 5.22 for location of Limestone formations).

East Lincolnshire Oolitic Ironstone-tempered Fabrics (ELFEOL) and East Lincolnshire Early Anglo-Saxon Quartz- and Oolitic Ironstone-tempered Fabrics (ELQFE)

Very few urns were identified in East Lincolnshire Oolitic Ironstone-tempered (ELFEOL) and East Lincolnshire early Anglo-Saxon Quartz- and Oolitic Ironstone-tempered fabrics (ELQFE) fabrics; there was just one example of ELFEOL and three of ELQFE from Elsham and one vessel from Cleatham that was initially identified in hand-specimen as NELESGS, but thin section analysis suggest that it should be re-classified as ELQFE. These fabrics have been discussed elsewhere (Vince 2007b; Perry 2009b), but it is worth reiterating these discussions in detail here. Vince initially identified ELFEOL fabrics at Lodge Farm, Skendleby (Lincolnshire) (Vince 2007b) and subsequently the current author identified ELEFOL fabrics in a small sample of urns examined from the cremation cemetery of South Elkington (Lincolnshire) (Perry 2009b). ELFEOL fabrics contain materials widely found throughout the region, including coarse grained sandstone and igneous rock fragments; characteristically, they also contain uncommon, well-rounded oolitic iron-rich grains (Vince 2007b). ELQFE fabrics are also characterised by oolitic iron-rich grains, but in this instance they are accompanied by well-rounded quartz sub-angular to rounded fragments of flint. ELQFE fabrics have only been previously identified on one other site in Lincolnshire – the cremation cemetery of South Elkington (Perry 2009b). There is considerable distance between Elsham, Skendleby and South Elkington; indeed, Skendleby is c. 58km south-east of Elsham, whilst South Elkington is c. 35km south-west of Elsham.

Petrographic Analysis

Thin section analysis (see Appendix D.2, Oolitic Ironstone Petrographic Group) as part of this study confirmed the mineralogical inclusions noted in hand specimen, but in addition it also identified fragments of limestone, calcareous sandstone fragments, sandstone with kaolinite cement (probably the Carboniferous Millstone Grit Sandstone of the Pennines – see Vince 2003a, 9-10; Vince 2004, 6-9), weathered microcline and plagioclase feldspars and glauconite. This lithology accords with that identified by Vince in his analysis of samples from Skendleby (Vince 2007b). All inclusions seen in the samples from the present study can be identified in the solid and drift geology of the Lincolnshire Wolds. For example, the Tealby Formation overlays the Claxby Ironstone, which in turn overlays the Cretaceous Spilsby Sandstone; all crop out along the Wolds' edge. The Claxby Ironstone is a muddy oolitic ironstone, containing goethite ooliths and glauconite. Goethite ooliths and glauconite are also present in the ferruginous Tealby Formation, which contains the Tealby Limestone, and finally the Spilsby Sandstone comprises poorly sorted medium sand to very coarse to granular sub-angular to rounded quartz, chert and rarely medium sand sized microcline feldspar and polycrystalline quartz (Gaunt *et al.* 1992, 63-7).

The weathered feldspars and the coarse grained sandstone with kaolinite cement can be identified in glacial deposits on, and at the foot of, the western facing scarp of the Wolds (see Figure 5.19 for the location of glacial deposits). Here, glacial deposits of sand, gravel and clay contain a range of far-travelled erratics, including igneous rocks from south-western Scotland and the Pennines (see CHARN fabrics below for further details) and the Carboniferous sandstones from the Pennines (Ixer and Vince 2009, 12; Wilson 1971, 72, 78-80; Gaunt *et al.* 1992, 120-1, Vince 2007b, 4).

Frequency and Distribution within the Study Area and the Cemeteries of Elsham and Cleatham

With so few samples of these fabric types it was not possible to identify any patterns in the distribution of fabrics within Elsham, or more broadly in the north of the county as a whole. This is unsurprising given that these fabrics appear to have a more southerly origin. Indeed, the presence of these fabrics in Elsham and Cleatham tell us that either potters were travelling over long distances to obtain their raw materials for potting or else the pots themselves were being manufactured in southern and central Lincolnshire and were then transported northwards towards Elsham and Cleatham.

Settlement and Cemetery Relationships

Given that these samples were identified only at Elsham, it was not possible, using thin section analysis, to identify any relationships between settlements and cemeteries. However, the fabric of samples MT013 and ELAJ117 are identical, from Cleatham and Elsham, respectively (Figure 5.18). These samples would merit comparison with samples from South Elkington and those from Skendleby that were analysed by Vince (2007b).

Figure 5.17: The locations of geological formations matching the lithology of ELFEOL and ELQFE fabrics.

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Figure 5.18: Photomicrographs of the ceramic fabric of samples of the Oolitic Ironstone Petrographic Group. The fabrics of samples ELAJ117 and MT013 are identical. Note the abundance of spherical opaques that characterise this petrographic group. See Figure 5.17 for the locations of geologies that would provide the lithology noted in these thin sections. (Images taken in cross-polarised light, image width 3.5mm.)

Charnwood-type Fabrics (CHARN)

Charnwood-type fabrics are characterised by their main non-plastic inclusion – fragments of acid igneous rock (Young *et al.* 2005, 31). In hand specimen it is possible to identify coarse fragments of the rock itself and also disaggregated grains of feldspar, quartz, and mica. Other minor inclusions include sandstone, organic matter, limestone, and iron opaques.

It has been long argued that early Anglo-Saxon ceramics tempered with igneous rock had their origins in the Charnwood Forest area of Leicestershire, and that they were produced there and then disseminated amongst the communities of midland and eastern England (Williams and Vince 1997; Young *et al.* 2005, 31; Young and Vince 2009, 346; Ixer and Vince 2009). Recent studies, however, are beginning to demonstrate that the situation is much more complex. Indeed, Ixer and Vince (2009) undertook petrographic analysis on early Anglo-Saxon pottery from both funerary and non-funerary sites in North and East Yorkshire, and demonstrated that just five out of a total of 47 samples from thirteen sites had possible Leicestershire origins. They established that the igneous materials in the reminder of the samples derived from granitic formations in the north of England and south-west of Scotland.

Such northerly origins for these granitic clasts in early Anglo-Saxon pottery from Yorkshire might seem odd, yet as fragments of these far-travelled rock types were deposited in North and East Yorkshire by glacial action, their presence in Ixer and Vince's (2009) samples is readily explained. With granitic clasts occurring in the glacial deposits of Yorkshire, Ixer and Vince concluded that the majority of the sampled granitic-tempered pottery had been produced using materials available within a few kilometres of each of the thirteen Yorkshire sites. It was extremely important to the current study, then, to establish whether samples obtained from North Lincolnshire sites derived from Leicestershire or whether they were produced to using locally available materials. To gain a broad understanding of the igneous pottery in the study area a large number of acid igneous tempered sherds were selected for thin section analysis; eleven sections were taken from Elsham, fifteen from Cleatham, and eighteen from the non-funerary find sites.

Petrographic Analysis

The same glaciers, and their associated lakes and melt-waters, that passed through North and East Yorkshire, bringing igneous material from Scotland and the Pennines, also passed into North Lincolnshire (Swinnerton and Kent 1976, 84-93; Wilson 1971, 71-80; Kent 1980, 118-27), and so it was possible, using Ixer and Vince's descriptions of the mineralogy of each of the northern igneous rock types (and the Leicestershire sources), to suggest the origin of the granitic inclusions in the 39 North Lincolnshire samples. Furthermore, by considering the course that these glaciers followed, and the presence and absence of a range of accessory minerals within each of the thin sections, it was possible to suggest geographical and geological locations for the sources of raw materials used to make this Lincolnshire group of granitic-tempered pottery. Notably, not a single sample in this group of 39 sherds could be attributed to a Leicestershire source.

Three broad groups were identified in thin section: the Elsham Granite Group, the Cleatham Granitic Group, and the Two-Mica Granite Group (see Appendix D.2). The mineralogical composition of the granitic clasts in the Elsham Granite Group and the Cleatham Granite Group, indicate that the most likely sources of igneous material are the Criffel-Dalbeattie granodiorite of south-western Scotland, the Shap adamellite of the Pennines, and the Cheviot Hills granite of Northumberland. Glaciations that brought material from south-western Scotland, the Pennines, Lake District and

Northumbria explain the presence of this lithology in these samples. Granites from south-west Scotland (the Criffel-Dalbeattie) and the Pennines (the Shap) were carried southwards through the Vale of York by pre-Devensian ice flows that passed over much of the county. A second ice flow, later in the Devensian period, again carried material from south-west Scotland, through the Pennines, into the Vale of York, and as far south as the Trent Valley and the Isle of Axholme in North Lincolnshire. Subsequently, the melt waters from this ice formed Lake Humber which flooded the Trent Valley and spilled into the Ancholme Valley (Wilson 1971, 72, 79-80; Gaunt *et al.* 1992, 109-23; Ixer and Vince 2009, 14). Therefore, these glaciers, and their associated melt-waters and lakes, deposited erratics of Scottish and northern English origin in North Lincolnshire, west of the Wolds.

A third ice flow, again in the Devensian period, carried the same Scottish material (the Criffel-Dalbeattie) through into Northumbria and then southwards along the east coast. In passing though Northumbria this latter flow picked up material from the Cheviot Hills, including a pyroxene bearing granite. It is worth noting that this Devensian ice deposited material on the eastern edge of the Wolds and it is known just east of Melton Ross (just a few kilometres east of Elsham) (Wilson 1971, 72, 79-80; Gaunt *et al.* 1992, 109-23; Ixer and Vince 2009, 14). Notably, as this flow did not pass through the Pennines and Vale of York it did not pick up the Shap granite, nor did it collect fragments of Carboniferous sandstone.

The only samples in which fragments of pyroxene-bearing granite form the Cheviot Hills were identified derived from Elsham. Their occurrence in these samples can be explained by considering the course of the glaciers that were described above. In the Devensian period a glacier carried Cheviot Hills material southwards, along the east coast of England. This glacier passed into the Humber Estuary and rose up onto the eastern edge of the Wolds - its deposits are known close to Melton Ross. It did not, however, penetrate overland towards Cleatham, and, therefore, the presence of Cheviot Hills material in the Elsham samples, and its absence from the Cleatham samples, accords with the geology of the county.

The Cleatham and Elsham Granitic Groups are not only differentiated on account of the presence or absence of pyroxene-bearing granite. For example, the Elsham Granitic Group contains a range of accessory minerals that are characteristically Wolds-based (such as oolitic ironstone and calcareous cemented sandstone, deriving from the Claxby Ironstone and Elsham Sandstone, respectively) which suggest a point of production east of the River Ancholme. In contrast, samples in the Cleatham Granitic Group possess additional material that is characteristic of geology west of the Lincolnshire Wolds (for example, fossiliferous limestones of Jurassic origin). A more detailed discussion of these mineralogical differences, and their geological sources, is provided in Appendix D.2.

Finally, the suite of minerals present in the rock fragments that characterise the Two-Mica Granite Group (Appendix D.2) are typical of the Cairnsmore of Fleet granite and the Criffel-Dalbeattie granodiorite. The Cairnsmore of Fleet granite is a 'microcline-bearing, two-mica granite with quartz, plagioclase, potassium feldspar (including coarse grained microcline), biotite and primary, often coarse grained muscovite' (Ixer and Vince 2009, 17). Samples in this group also contain perthite, a mineral characteristic of the Criffel-Dalbeattie granodiorite. The course followed by the Pleistocene and Devensian drifts that were deposited in the north of the country readily explain the presence of this suit of minerals and rock types in these samples. As discussed above, glacial action brought fragments of northern igneous rocks southwards from northern England and south-western Scotland. In particular, the ice sheets carried materials from the Cairnsmore of Fleet and Criffefel-Dalbeattie outcrops. The ice passed through the Vale of York, bringing with it other material, such as the Shap granite from the Lake District, and Carboniferous Sandstones. These glacial erratics were carried south, through the Vale and in to the Trent Valley (Ixer and Vince 2009, 12; Wilson 1971, 72, 78-80). The ices flows formed various blockages in the low lying ground, and melt-waters from these glaciers formed glacial lakes and channels. The various rocks that had been carried by the glaciers were transported by this melt-water into the lakes and river channels. In particular, this formed Lake Humber, which covered the Ancholme Valley and the Vale of York.

The Cairnsmore of Fleet and Criffel-Dalbeattie material was also carried south-eastwards, through the Tyne gap, where it merged with ice sheets containing material from the Cheviot Hills. This ice moved south, along the east coast of England. Notably, it did not collect material from the Vale of York. The deposits from this glacier are largely confined the eastern edge of the Lincolnshire Wolds, although a small deposit of till just east of West Halton marks the most westerly advance of this ice sheet (Gaunt *et al.* 1992, 118). Given the present of Carboniferous Sandstone in these samples, it is likely, then, that the sands, gravels and clays used to prepare the paste of these samples derive from deposits west of the Lincolnshire Wolds. It is probable, then, that as samples belonging to this petrographic group were found at both Elsham and Cleatham, that the potters producing pottery on both sides of the River Ancholme were exploiting raw materials available in the Ancholme Valley.

Frequency and Distribution within the Study Area and the Cemeteries of Elsham and Cleatham

Granite-tempered pottery was relatively common at both Elsham and Cleatham, accounting for c.10% of their respective assemblages (Table 5.1). It is unsurprising to find, then, that at Cleatham these fabrics are relatively evenly distributed across the site (Figure 5.20). A similar pattern is noted at Elsham, although there is an apparent lack of CHARN-type fabrics in the south-east of the cemetery. When compared to the distribution of SSTCAC (Calcareous Sandstone-tempered fabric), it is interesting to note that the south-western edge is where the majority of the SSTCAC samples are located (Figure 5.10). Perhaps this suggests the use of different areas of the cemetery by communities that preferred to use different types of tempering materials and raw materials sources. Unlike dung-tempered pottery (ECHAF), or iron-pellet tempered pottery (FE), there are no clear patterns in the distribution of CHARN-type fabrics within North Lincolnshire. Indeed, the use of granitic rock as a means of tempering clay was a relatively common practice across the whole study area (Figure 5.19).

Settlement and Cemetery Relationships

Despite the large number of CHARN-type fabrics examined in thin section, only one example of a relationship between sites was identified. The fabric of sample GP077 from Messingham (MSAB) was identical to that of GP109 from a field-walked site at Manton, OS0034. These two sites are just c. 3km apart and this relationship might represent either pots that were made and used at these separate sites, using the same locally availably raw materials, or two vessels with a common place of production; these possibilities will be discussed further later in this chapter.

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Figure 5.19: The locations CHARN find-sites in North Lincolnshire and the distribution of glacial deposits that would provide the sources of igneous materials identified in thin section.

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Figure 5.20: The distribution of CHARN-type fabrics within the cemeteries of Elsham and Cleatham. Note that at Elsham this fabric-type is absent from the south-eastern corner of the cemetery. Contrast this with the distribution of SSTCAC fabrics (Figure 5.10); SSTCAC fabrics are most common in this south-eastern corner.

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Figure 5.21: Photomicrographs of the ceramic fabric of samples of the Cleatham Granitic Petrographic Group. The fabrics of samples GP077 and GP109 are identical. See Figure 5.19 for the locations of geologies that would provide the lithology noted in these thin sections. (Images taken in cross-polarised light, image width 3.5mm.)

Limestone-tempered Anglo-Saxon Fabrics (LIMES)

In hand specimen Limestone-tempered Anglo-Saxon Fabrics (LIMES) are characterised by moderate to common inclusions of fragments of limestone. They may be accompanied by other minor inclusions such as oolite, calcareous and non-calcareous sandstones, igneous rock fragments, rounded quartz grains and chert. These accessory inclusions are largely the result of the range of different clays used by the potters.

Petrographic Analysis

Thin section analysis reveals that potters tempering their clay with limestone were exploiting a range of different limestones and clay types. Based on the lithology and range of fauna preserved in the limestone it was possible to separate the limestone tempered samples in to three broad groups: those manufactured using materials derived from west of the River Ancholme (the Cleatham Limestone Group); those produced using materials deriving from the east, on the Lincolnshire Wolds (the Elsham Limestone Group); and, finally, one single sample that seems to have a source from somewhere in Yorkshire (Sparry Calcite and Dolerite Group - see Appendix D.2).

The Cleatham group is characterised by the diversity of the fauna in the limestones (Figure 5.24). Species identified include brachiopods, gastropods, pseudo punctuate brachiopods, impunctate brachiopods, ribbed impunctate brachiopods, molluscs, crinoids, and echinoids. The proportions of species present varied considerably between samples. In some, the limestones were dominated by brachiopod shells (in hand specimen these samples had initially been identified at ASSHQ, ASQSH and ASSH, see above) and in others brachiopods were a minor constituent and were accompanied by crinoids, echinoids and gastropods.

The fossils that characterise the limestones in this group are present in the various beds that make up the Lincolnshire Limestone, such as the Snitterby Limestone, Cleatham Limestone, Scawby Limestone, Kirton Cementstones, Marlstone Rock Member and the Hibaldstow Limestone. All crop out at various points along the limestone scarp, from Winterton in the north to Kirton-in-Lindsey in the south (Gaunt *et al*. 1992, 46-55), and there is, therefore, little merit in attempting to determine exactly which limestone each sample is derived from (Figure 5.22). Although the potters producing the limestone tempered fabrics in this group used a number of clays, including silty clays, probably deriving from alluvial deposits, and possibly also Jurassic clays, the dominant type of clay utilised was boulder clay.

Samples placed in the Elsham Limestone Petrographic Group are distinguished from the Cleatham Limestone Group on account of the character of the limestone inclusions. Where the Cleatham samples contained well-preserved fossils, the fossils in this group were completely micritised (that is that the structure of the fossils has been dissolved and completely replaced by micrite) (Figure 5.24). In addition, the limestone fragments in the Elsham Limestone petrographic Group were heavily bioturbated, demonstrated by numerous bioturbation burrows, and these burrows are accompanied by worm tubes and micritic peloids. These features are characteristic of the Cretaceous Tealby Limestone, which is located on the Lincolnshire Wolds (Gaunt *et al*. 1992, 74). Significantly, this limestone crops out c. 14km south of Elsham, at Nettleton (Figure 5.22) (Gaunt *et al*. 1992, 75).

Finally, one particular sample from Elsham (ELAJ132 – the Sparry Clacite and Dolerite Group, see Appendix D.2) draws no comparison with composition of fabrics from either the Cleatham or the Elsham Limestone Groups (Figure 5.24). The fabric of this sample is characterised by coarse angular grains of sparry calcite that appear to have been crushed and added to as ferruginous boulder clay. That the parent clay was boulder clay is suggested by the presence of dolerite. The source of the sparry calcite is puzzling. Although calcite tempered pottery is occasionally found on sites on the

Lincolnshire Wolds, it is rare (Young and Vince 2009, 349). Contrastingly, this type of pottery is a common find in Yorkshire, and as such it is generally perceived that Lincolnshire's sparry calcite-tempered pottery was 'imported' from there (Young *et al.* 2005, 32). The sparry calcite that is used to temper the Yorkshire pottery is believed to have been obtained from calcite veins present in the chalk of the Yorkshire Wolds (Young, *et al.* 2005, 32). Given that Lincolnshire's Wolds are a southerly continuation of those in Yorkshire it is possible that this sample was produced using calcite obtained from a vein in the chalk of the Lincolnshire Wolds, perhaps from a source close to Elsham. However, as there are no accessory minerals or lithological clasts in this sample which have a clear Lincolnshire Wolds origin, there is nothing that would support such a notion. For example, there are no coarse well-rounded quartz or chert grains, nor are there any fragments of calcareous cemented sandstone or oolitic ironstone, which, as we have seen, are often found as accessory minerals in Wolds produced pottery (see for example, Elsham Granitic Group). Perhaps the only clast which might hint at an origin on the Lincolnshire Wolds is the fragment of dolerite. Dolerite, deriving from Whin Sill, is known in the glacial clays and tills that flank the Wold's eastern edge (Gaunt *et al.* 1992). However, as we shall see, the presence of this dolerite might also be used to support the notion of a Yorkshire origin.

In Yorkshire, sparry calcite tempered pottery is known from the early Anglo-Saxon cemeteries of Sancton (East Yorkshire) (Vince 2004) and West Heslerton (West Yorkshire) (Haugton and Powlesland 1999, 124-7), the Iron Age sites of Rudston, Burton Fleming (Freestone and Middleton 1991, 163) and Burton Agnes (Rigby 2004, 7-11), and the Bronze Age site of Thwing (Wardle 1992, 115). Notably, like our sample, some of the sparry calcite-tempered pottery from Thwing contains dolerite. A comparison with this Thwing pottery is, therefore, imperative as this could confirm or refute an East Yorkshire provenance.

Frequency and Distribution within the Study Area and the Cemeteries of Elsham and Cleatham

Given Cleatham's proximity to numerous Jurassic limestone formations, and Elsham's remoteness from limestone formations, it is unsurprising that Cleatham has the higher proportion of LIMES urns (Table 5.1). Yet, limestone tempered fabrics do not account for significant proportions of the urn assemblages at either of the cremation cemeteries (1.6% and 3.5% at Elsham and Cleatham, respectively). The relative paucity of LIMES pottery in the cemeteries is generally mirrored in the non-funerary assemblages. Indeed, at the majority of non-funerary find sites, where limestone tempered pottery was identified, LIMES is represented by only one or two sherds. In accordance with the proportions of LIMES urns in the cemeteries, the bulk of non-funerary find sites at which LIMES fabrics were found are located to the west of the River Ancholme, close to the Jurassic limestone formations (Figure 5.22).

It is interesting to note that at West Halton a significant number of LIMES vessels were identified (n = 37); these account for 8% of the site's early to middle Anglo-Saxon assemblage (Perry 2007a). One could argue that this apparently 'inflated' assemblage is a result of West Halton being excavated, whereas the majority of assemblages from other find sites were chance surface finds. However, when these percentages are compared with those from sites with other large assemblages, such as Flixborough (FXAE and FXAF, 6%, 5/98 vessels) and Burton-upon-Stather (BSAE, 8%, 9/115 vessels), both of which are near West Halton in the north-west of the study area, with Scotton (SNAC, 2%, 4/175 vessels) and the cumulative assemblage of the field-walked site at Manton (MTFW, MTBV and MTAS, 3%, 3/89 vessels) (Appendix D.1), both of which are in the south-west, it would appear that there is a preference for LIMES fabrics at north-western sites. It is unfortunate, then, that the Bagmoor cemetery at Burton-upon-Stather was destroyed by ironstone mining in the 1920s (Leahy 2007a, 12), as this would have provided a north-westerly funerary assemblage with which to test this hypothesis.[2]

There is little to be said about the distribution of limestone-tempered pottery within the cemeteries. At Cleatham LIMES fabrics are relatively evenly scattered across the site, whilst at Elsham the majority of LIMES urns are located in the eastern burial area (Figure 5.23). It is interesting to note that at both cemeteries the LIMES distribution follows that of the oolitic limestone-tempered pottery (LIM, see below) tempered pottery. This probably demonstrates that the potters were selecting the raw material on account of it being a limestone, rather than, specifically, an oolitic limestone, or a fossiliferous limestone.

[2] There are only two urns from this site that survive; both are on display in North Lincolnshire museum. Given the miniscule numbers that survive, any comparisons drawn with the fabrics of these urns would be all but meaningless.

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Figure 5.22: The locations LIMES find-sites in North Lincolnshire and the distribution of geological deposits that would provide the source of limestones identified in thin section.

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Figure 5.23: The distribution of LIM and LIMES fabrics within the cemeteries of Elsham and Cleatham. Note that at Elsham this fabric-type mainly found in the eastern half of the cemetery.

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Figure 5.24: Photomicrographs of the ceramic fabric of samples of the various limestone petrographic groups (Images taken in cross-polarised light, image width 3.5mm.)

Settlement and Cemetery Relationships

Although a number of samples from the non-funerary find sites were identified as belonging to the same petrographic groups as the cemetery samples, it was not possible to identify identical examples at both cemeteries or at a settlement and a cemetery. Despite this, a broad pattern emerges, which reveals that all those samples for which a Wolds-based production site was suggested derived from sites on the Wolds, whilst samples attributed to the Cleatham Limestone Group derived from sites to the west of the River Ancholme.

Oolitic Limestone-tempered Fabrics (LIM)

Oolitic Limestone-tempered Fabrics (LIM) are characterised by the main tempering agent, oolitic limestone (Boyle *et al.* 2008). The ooliths range in size from c. 0.5mm in diameter up to 1mm; these are normally accompanied by fragments of oolitic and fossiliferous limestone and other minor inclusions such as sandstone, calcareous sandstone and igneous rock fragments.

Petrographic Analysis

Thin section analysis reveals a relatively homogenous group, characterised by the presence of oolitic limestone fragments which have been added as temper to boulder clays (see Appendix D.2; Cleatham Oolitic Limestone Group). In some samples it is likely that the limestone was crushed prior to being added to the clay, whilst in others the limestone fragments are considerably rounded, suggesting that the temper may have taken the form of detrital sands. The oolitic limestones are likely to derive from limestones within the broader Lincolnshire Limestone: for example, the Santon Oolite, Elleker Limestone, Scawby Limestone, and the Hibaldstow Limestone are all , to varying degrees, oolitic (Gaunt *et al*. 1992, 48-54). The characteristics of these various limestones conform to those observed in thin section (see Appendix D.2 for a full discussion) and as these limestones crop out at various points along the limestone scarp of Lincoln Edge it is likely that one or more provide the source of raw materials for tempering this group – the Scawby Limestone is known to crop out at Broughton and near West Halton, the Santon Oolite forms a scarp south of Winterton, and the Hibaldstow limestone is exposed around Hibaldstow (Figure 5.25) (Gaunt *et al*. 1992, 48-54).

The range of accessory minerals and lithologies noted in hand specimen was confirmed by thin section analysis. These minerals and rock clasts comprise kaolinite cemented sandstone and igneous rock fragments (both granites and dolerite, probably deriving from the Pennines, Cheviot Hills and south-western Scotland). In conjunction with the oolitic limestone, this lithological suite suggests that the glacial deposits on the western bank of the River Ancholme provide the raw materials for potting. Indeed, Gaunt *et al*. (1992, 118) note porphyrites in the Devensian deposits around Winterton and this would account for the dolerite identified in thin section. Glacially derived clays would also account for the plutonic igneous and medium grained sandstones with kaolinite cement noted in a number of samples and we have already discussed how these materials came to be in the north of the county and particularly in the Trent and Ancholme Valleys (see CHARN type fabrics, above, and SST fabric types, below, particularly the Glacially Derived Sandstone Group for a discussion on the origins of these clasts, below and Appendix D.2).

Frequency and Distribution within the Study Area and the Cemeteries of Elsham and Cleatham

Oolitic limestone was not a particularly common choice of tempering material for the early Anglo-Saxons. Indeed, such fabrics account for a mere 1.4% of the assemblage at Elsham and just 3.6% at Cleatham (Table 5.1). These frequencies are almost identical to those of the limestone (LIMES) tempered group. It is not surprising that Cleatham has the highest proportion of this fabric group, given that it is located within just a few kilometres of numerous oolitic limestone formations. The paucity of oolitic limestone tempered urns in the cemeteries is mirrored at the non-funerary find sites. Of the eight non-funerary find sites at which LIM fabrics were identified, only two − Manton Warren (MTDB) and West Halton (WHA) − possessed more than a single vessel. Even at West Halton, the site with the largest assemblage of oolitic limestone tempered fabrics (fourteen vessels), this fabric still only accounts for 3.5% of the whole assemblage. Regardless of these small numbers, it is still possible to observe that the majority of sites where LIM was identified were to the west of the River Ancholme, where all of North Lincolnshire's oolitic limestone formations are located (Figure 5.25).

Within the cemeteries themselves, the distribution of urns of LIM fabric largely follows that of the urns of limestone-tempered fabric (LIMES) (Figure 5.23). At Elsham, we see that that the majority of LIM urns are located in the western half of the cemetery, being largely absent from the eastern half. At Cleatham, LIM urns are spread across the site, being slightly more common in the northern areas of the cemetery (although this is perhaps a result of a general lack of urns in the south of the cemetery). It is interesting to note that even though the LIM urns at Cleatham are relatively evenly distributed, they do seem to occur in small clusters of two or three urns (Figure 5.23). This might suggest that burial was taking place in community or family groups.

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Figure 5.25: The locations LIM find-sites in North Lincolnshire and the distribution of geological deposits that would provide the source of oolitic limestones identified in thin section.

Settlement and Cemetery Relationships

Despite the small number of oolitic limestone tempered sherds found in the study area, it was possible to identify a number of ceramic relationships between the various study sites. Sample ELAJ027, from Elsham, is identical to WHA15 from West Halton, and further links between the eastern and western banks of the River Ancholme are demonstrated by the fabrics of samples GP104 and GP036 from Manton Warren (OS8500) and Melton Ross (MRBD), respectively. It is likely, then, based on the archaeology and geology, that these cross-river links are the result of oolitic limestone-tempered pottery being manufactured to the west of the River Ancholme and then transported to those sites on the east side of the river.

Figure 5.26: Photomicrographs of the ceramic fabric of samples of the Cleatham Oolitic Limestone Petrographic Group. The fabrics of samples ELAJ027 and WHA15 are identical as are those of GP036 and GP104; see Figure 5.55 for locations of find-sites. (Images taken in cross-polarised light, image width 3.5mm.)

Sandstone Tempered Fabrics (SST)

In hand specimen, SST fabrics are characterised by the inclusion of fragments of fine to coarse grained sandstone. A range of minor accessory inclusions are often noted in the fabric, including igneous rock fragments and their constituent minerals, grass, iron-rich material, limestone and rounded grains of sand (Young *et al.* 2005, 29).

Petrographic Analysis

A number of sandstone tempered sherds were sampled; sixteen from Elsham, 40 from Cleatham and thirteen from the non-funerary find sites. These were separable into three broad petrographic groups: those that were tempered fragments of medium grained haematite-cemented sandstone that had been crushed prior to being added to the clay (Medium Grained Sandstone Group – see Appendix D.2); those that are characterised by a glacial sand, composed primarily of fragments of coarse grained kaolinite-cemented sandstone (Cleatham Glacially Derived Sandstone Group – see Appendix D.2); and, finally, a group those that contains fragments of four different sandstones. Typically, samples within the group contain two or more of the four, but this is likely to be due to the small proportion of a pot that a thin section represents, rather than being a real difference in fabric type (the Elsham Glacial Sand/Sandstone Group – see Appendix D.2).

The Medium Grained Sandstone Group is characterised by fragments of medium grained sandstone with ferruginous cement. The angularity of these fragments demonstrates that the sandstone was crushed prior to being added to the clay. A range of accessory lithologies are present in samples attributed to this group, including quartz, chert, microcline feldspars, muscovite mica, fossiliferous limestone, very rare fragments of fine grained calcareous sandstone and rounded grains of metamorphic rock. These accessory materials are likely to have been present in the parent clay – a boulder clay – rather than being added as temper. Sixteen of the eighteen samples placed in this group derive from sites on the west of the River Ancholme (from Cleatham, Manton (MTCC), Flixborough (FXAE), and Messingham (MSAB)), suggesting that the source of this sandstone lies to the west of the river. It is encouraging to find, then, that a medium grained, ferruginous quartz-sandstone, the Northampton Sand, the lithology of which conforms to that of the sandstones noted in these samples, is known to crop out at various locations in close proximity to these sites (Gaunt *et al.* 1992, 44-5). It seems highly likely that the Northampton Sand is the ultimate source of the sandstone seen in these samples (Figure 5.27 and 5.30), although geological sampling would be required to confirm this (see Appendix D.2, Medium Sandstone Group for a full discussion of the characteristics of this petrographic group).

The second petrographic group, the Cleatham Glacially Derived Sandstone Group, is very homogenous, characterised by fine to coarse grained kaolinite cemented sandstone that has been added as temper to relatively fine boulder clay. The sandstone fragments, and their associated disaggregated grains, are accompanied by plutonic igneous fragments, and iron opaques. The consistent grain-size sorting of the sandstone, igneous and iron opaques suggests that the potters were obtaining their temper from a glacial deposit, probably a sand, and that all these lithologies were present in that source. Some grains do show signs of having being crushed, indicated by the angularity of some sandstone fragments, which might suggest that sand was prepared by grinding before being added to the clay as temper, although, as Russel (1984, 545) notes, it is often difficult to determine whether sandstones deriving from glacial deposits have been crushed prior to addition to the clay. Indeed, this angularity may simply be a characteristic of the sand deposit; as Wardle (1992, 58) notes, glacial action usually gives rise to angular fragments.

The range of inclusions noted in samples attributed to this group is of considerable interest as almost none can be attributed to a local origin source. The sandstones with kaolinite cement and overgrown quartz grains are characteristic of sandstones found in the Pennines and the Vale of York (see for example Vince 2002b; 2003b; 2006), whilst the igneous clasts suggest igneous formations from the south-west of Scotland and the Pennines (as in the CHARN-fabrics, see above). As outlined above, pre-Devensian and Devensian glaciers from the south-west of Scotland travelled south, through the Pennines, into the Vale of York, collecting materials on their way and they and their associated melt-waters deposited them in the Trent and Ancholme Valleys (Wilson 1971, 72, 79-80; Gaunt *et al.* 1992, 109-23; Ixer and Vince 2009, 14). There are, thus, numerous glacial deposits in North Lincolnshire, west of the Lincolnshire Wolds, which would account for the suite of lithologies noted in these samples (Figure 5.28). The homogeneity of this group, however, suggests that the potters were probably exploiting only a single deposit.

The final sandstone group, the Elsham Glacial Sand/Sandstone Group, is characterised by the inclusion of four different types of sandstone. One is a medium to coarse grained, slightly metamorphosed arenite, the second is characterised by overgrown quartz grains in kaolinite cement, whilst the third comprises quartz grains within a cement of silt and haematite. The final, and fourth, is a calcareous cemented sandstone, probably the Elsham Sandstone. No sample was identified as containing all four types. Usually, two or three types are noted per thin section, but this is probably a consequence of the small proportion of the whole vessel that a thin section sample represents. All of the sandstone clasts show significant rounding, demonstrating that they have undergone considerable transport and that they were not crushed prior to being added as temper. Plutonic igneous rock fragments of a similar size and rounding to the sandstone fragments are also present in these samples and cumulatively, these characteristics suggest that the source of temper was glacially derived sand.

Despite the broad range of inclusions within this Elsham Glacial Sand/Sandstone Group, there are characteristics lithologies within these samples which suggest an origin east of the River Ancholme and west of the Lincolnshire Wolds. Firstly, there are the fragments of Elsham Sandstone and coarse grains of chalcedonic chert; these are indicative of the Wolds. Secondly, although rare, there are the grains of pyroxene; pyroxene-bearing igneous rocks are characteristic of the Cheviot Hills (Northumbria) (Ixer and Vince 2009, 14). Notably, rocks derived from the Cheviot Hills are a constituent of the Devensian boulder clays (till) (Figure 5.28) that flank the eastern edge of the Wolds (see CHARN-fabrics discussion above). In contrast, the coarse grained kaolinite cemented sandstones suggest a source to the west of the Wolds (as outlined above). Thus, in this petrographic group we have a suite of minerals that are Wolds based, and a suite of minerals that are present in glacial deposits in the Ancholme Valley. As the Devensian glacier on the east of the Wolds did not cross them, but its melt waters flowed west, into the valley, through the Barnetby Gap (Straw and Clayton 1979, 30-1), perhaps we can suggest that the source of these raw materials lies somewhere between the River Ancholme and the foot of the Wolds. Certainly, there are numerous glacial deposits at the foot of the Wolds that might provide this material (Figure 5.28).

Figure 5.27: The locations of SST find-sites in North Lincolnshire and the location of the Northampton Sand, the probable source of the sandstones identified in the Medium Sandstone Petrographic Group.

Figure 5.28: The locations of SST find-sites in North Lincolnshire and the locations of glacial deposits that provide the source of the various glacially derived sandstones identified in thin section.

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Figure 5.29: The distribution of SST fabrics within the cemeteries of Elsham and Cleatham.

Frequency and Distribution within the Study Area and the Cemeteries of Elsham and Cleatham

The first point to note is that SST fabrics were the most common fabric types identified among the urns at the both Cleatham and Elsham − 35% and 21% of the assemblages respectively (Table 5.1). With such frequency it is not surprising to find that at both cemeteries SST fabrics are evenly and widely distributed across the sites. Even at Cleatham, with the two petrographic groups (the Medium Sandstone Group and the Cleatham Glacially Derived Sandstone Group), there is no specific pattern and both groups are widely distributed.

When the distribution of sandstone tempered fabrics within the north of the county is considered, we see that SST fabrics are, as they are in the cemeteries, widely distributed. There are some points of note, however, that are worth discussion; these relate to the distributions of the three petrographic groups and differences between the frequencies of SST fabrics at individual sites. Firstly, the Medium Sandstone Group is concentrated around Cleatham. As noted above, sixteen out of the eighteen samples attributed to this group come from Cleatham and sites around it. Likewise, the distribution of the Cleatham Glacially Derived Sandstone Group is focussed around Cleatham. Of the 40 samples placed in this group, 28 come from the Cleatham cemetery itself, seven from the field-walked sites around Manton (MTFW, MTBX and MSAB), and of the remaining five, four come from sites on the Wolds, in particular Elsham, Melton Ross and Barnetby-le-Wold (see below), while the last sample is from Barton-upon-Humber (BNAS). Finally, all samples attributed to the Elsham Glacial Sand/Sandstone Group derived from Elsham. Thus, we have three petrographic groups, which have three discrete locations, and when these distributions are combined with the results of petrological analysis, we see that that the distributions accord with the geology within the areas that each petrographic group is focused.

The second point to note is that whilst SST fabrics are common, and apparently widely distributed, there are some sites and areas in which this apparently common fabric type is conspicuous by its absence. At Messingham (MSAB), for example, SST fabrics account for 20% of a 261 vessels, at Scotton (SNAC) they constitute 22% of total 175 vessels, at Flixborough (FXAE, FXAF) 21% of 78 vessels and at Melton Ross (MRBD, MRBF, BBNB) 27% of 156 vessels (Appendix D.1). In contrast, however, at Caistor (CAAG), on the Lincolnshire Wolds, these fabrics account for just 4% of 68 vessels, and at West Halton, in the very north of the study area, they constitute just 9% of a total 417 vessels (Appendix D.1). This may be down to raw material availability, but equally it may be a cultural choice. This issue requires further investigation and samples of SST fabrics from Caistor need to be examined in thin section to determine whether they contain material from the vicinity of the site, or whether these sherds derive from vessels that were imported to the site from a production place elsewhere.

Settlement and Cemetery Relationships

A considerable number of significant relationships were identified within these sandstone tempered petrographic groups that demonstrate links between the cemeteries and the settlements that surround them. Within the Medium Sandstone Group, for example, the fabric of a sample from Messingham (MSAB, sample GP071) is identical to a number from Cleatham (Figure 5.30) (samples MT070, MT078, MT165, MT189); Messingham is just c. 4km north-west of Cleatham. In contrast, the very same Messingham and Cleatham samples are completely indistinguishable from sample ELAJ089 from the cemetery of Elsham. There is no doubt that the origin of this Elsham vessel lies close to Cleatham and that it was transported across the River Ancholme to Elsham.

The Cleatham Glacially Derived Sandstone Group (Figure 5.31) demonstrates a similar pattern to that observed with the Medium Sandstone Group. In this petrographic group, samples GP078, GP082 and GP086, all from Manton Warren (MTBX), c. 3km north of Cleatham, are identical to a number of samples from Cleatham. Significantly, sample ELAJ085, from Elsham, is also identical to samples from Cleatham (for example, samples MT075 and MT080, Appendix D.2; Glacially Derived Sandstone Group). The origin of this Elsham vessel, therefore, lies close to Cleatham, and it, too, appears to have been transported across the River Ancholme to Elsham.

Figure 5.30: Photomicrographs of the ceramic fabric of samples of the Medium Sandstone Petrographic Group. The fabrics of all samples shown here are identical (the slight differences in the colours of the clay backgrounds are the result of differences in firing conditions). (Images taken in cross-polarised light, image width 3.5mm.)

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Figure 5.31: Photomicrographs of the ceramic fabric of samples of the Cleatham Glacially Derived Sandstone Petrographic Group. The fabrics of all samples shown here are identical. Note the large fragment of kaolinite cemented sandstone in the bottom right hand corner of sample ELAJ085. (Images taken in cross-polarised light, image width 3.5mm.)

Local Anglo-Saxon Fabrics (ESAXLOC)

These fabrics are characterised by quartz inclusions which show no evidence of aggregation (Young *et al*. 2009, 348). Again these fabrics contain other inclusions such as igneous rock fragments, fragments of sandstone, chert, iron rich material, grass, and shell.

Petrographic Analysis

Petrographic analysis demonstrates that, whilst such fabric types are common, there are considerable differences between the fabrics present at different sites and in different geographical areas in the study area. Two main petrographic groups were identified: one comprises samples from Cleatham (Cleatham Sand Group – Appendix D.2) and its surrounding settlements and one comprising samples from Elsham (Elsham Sand Group – Appendix D.2). The Elsham Sand Group is characterised by medium grained sub-angular to well-rounded quartz grains, well-rounded chert grains, some of which are chalcedonic, and well-rounded microcline feldspars. Samples in this group also contain iron-rich ooliths, which, as we have seen, occur in most fabric types deriving from the Elsham cemetery (see NELESGS, ESMG, ELQFE, ELFEOL and CHARN-type fabrics, above). The mineralogy of this present group is very similar to that noted in the Very Coarse, Well Rounded Quartz and Chert Petrographic Group (see NELESGS above and Appendix D.2); however, this present group is separable from the latter on account of its smaller grain size and absence of rutile and zircon bearing quartz grains.

The Cleatham petrographic group is separable from the Elsham group on account of its mineralogy. The mineralogy of the Cleatham Sand Group is almost identical to that of the Cleatham Glacially Derived Sandstone Group. It comprises medium grained sand, composed of quartz, plagioclase and orthoclase feldspars, fine grained metamorphic rock – probably schist, and fragments of plutonic igneous rock and kaolinite cemented sandstone. However, the grains are smaller, better sorted, and considerably more rounded than those of the Cleatham Glacially Derived Sandstone Group. It is likely, then, that the potters responsible for producing this group of fabrics were sourcing their temper from a similar location to those of the Cleatham Glacially Derived Sandstone Group, but that the sand-temper in the latter group has been subject to further transport, such as in streams – resulting in the smaller grain size and rounding of the grains.

Frequency and Distribution within the Study Area and the Cemeteries of Elsham and Cleatham

Urns made from ESAXLOC fabrics account for a greater proportion of the assemblage at Cleatham than they do at Elsham (Table 5.1). This pattern is mirrored in the non-funerary find sites that surround these cemeteries. As Figure 5.32 reveals, the largest assemblages of ESAXLOC are all found on the western bank of the River Ancholme, around Cleatham and Bagmoor. This is not simply a consequence of large assemblages being recovered on the western banks of the river. Indeed, a comparison of the assemblages from Manton Warren (MTBX), Burton-on-Stather (BSAE), Crosby Warren (CRWA, CRWB, CRWE) and Melton Ross (MRBD), all of which have vessel counts in excess of 100 vessels (the first three sites are located on the western bank of the River Ancholme, whilst the latter is located on the eastern bank), reveals that ESAXLOC fabrics account for 37%, 36%, 55% and 10% (Appendix D.1) of the respective assemblages. Whilst one might argue that this tells us that the potters operating on the western banks of the river preferred to use sand as a means of tempering their clay, this is not necessarily the case. A very common fabric found on sites on the eastern banks of the river is the NELESGS fabric; being tempered with the decalcified detritus of the Spilsby Sandstone, NELESGS fabrics are also essentially tempered with sand. Thus, rather than being a specific cultural difference between the communities living on either side of the River Ancholme, we should see this as a pattern related to raw material sources.

The distribution of ESAXLOC fabrics within the cemeteries themselves does not reveal any obvious patterns; indeed at both cemeteries these fabric types are relatively evenly spread across sites.

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Figure 5.32: The locations ESAXLOX find-sites in North Lincolnshire.

Settlement and Cemetery Relationships

Only two ceramic relationships were identified between sites in the petrographic study of ESAXLOC fabrics. The fabric of sample GP054 is identical to GP080, whilst GP055 is identical to sample GP045. Samples GP054 and GP055 both derive from Manton field-walked site MTCC, whilst GP080 comes from Burton-upon-Stather (BSAE) and GP045 from Manton Warren (MTBX). That samples from MTBX and MTCC are identical is not surprising, given that MTCC is just 0.5km north of MTBX (Figure 5.33). The Burton-upon-Stather and the Manton field-walked site samples are significant, however, in that Burton-upon-Stather is 13km north-west of the Manton site. This raises the possibility that potters from these two sites were either sharing raw materials or that the pottery was moving; these alternatives will be discussed below.

Figure 5.33: Photomicrographs of the ceramic fabric of samples of the Cleatham Sand Petrographic Group. The fabrics of all samples MT045 and GP055 are identical, as are those of GP045 and GP080. (Images taken in cross-polarised light, image width 3.5mm.)

Minor Groups

Hand specimen identification of pottery from both Cleatham and Elsham, and the non-funerary find sites, identified a number of minor fabric types that have not been discussed above, for example Millstone Grit Sandstone-tempered Fabrics (SSTMG) and Charnwood-type Fabrics with Calcareous Sandstone (ELCHARNLOC) (see Table 5.1). Petrographic thin section analysis revealed that these minor groups are not distinct groups in their own right, but rather they are one end of a spectrum of variation of more established fabric types. For example, the fabrics of ten of Elsham's urns were identified as Charnwood-type Fabrics with Calcareous Sandstone Inclusions (ELCHARNLOC). In hand specimen these were separated from regular Charnwood-type fabrics (CHARN) on account of the presence of coarse fragments of calcareous sandstone within the fabric. Thin section analysis demonstrated that the fabric of many of Elsham's CHARN urns (see Elsham Granite Group, Appendix D.2 and CHARN fabrics, above) contained clasts of calcareous sandstone. It was simply the fact, then, that in those fabrics that were identified as ELCHARNLOC-type fabrics, calcareous clasts were more common and slightly coarser than in those identified as CHARN. Thus, this ELCHARNLOC fabric type should be seen as representing one end of a continuous spectrum of proportion of calcareous material present in CHARN-type fabrics, rather than being a different fabric type in its own right.

A similar situation can be suggested with those urns identified as being manufactured in SSTMG fabrics. SSTMG fabrics are characterised by very coarse inclusions of Millstone Grit sandstone and overgrown quartz grains. Such rocks are known to outcrop in the Vale of York and fabrics of this type are particularly common on sites within the Vale (Vince 2002b, 1; 2003c, 3). Thin section analysis of the SSTMG fabrics in the current study determined that they were tempered with a medium to very coarse grained, kaolinite-cemented sandstone. Thus, like many of the of the other vessels that in hand specimen had been identified as being tempered with sandstone, these SSTMG fabrics were attributed to the Glacially Derived Sandstone Petrographic Group (see SST, above, and Appendix D.2). As the origins of these very coarse and medium to coarse sandstones with kaolinite cement lie in the Vale of York (see SST discussion, above), and they both arrived in North Lincolnshire through glacial action, there is little merit in attempting to differentiate between the two.[3] The difference in the grain size within SST and SSTMG fabrics should therefore be seen as representing different points along a naturally occurring spectrum of grain size.

At Elsham and Cleatham a small number of urns were classified as SSTFEC – Ferruginous Cemented Sandstone fabrics. In hand specimen, at x20 magnification, SSTFEC fabrics were seen to contain medium to coarse grained sandstones, aggregated with what appeared to be brown, possible ferruginous cement. In some instances, thin section analysis confirmed this observation (for example, in hand specimen, the fabrics of samples MT010 and MT006 were identified as SSTFEC – thin section analysis attributed them both to the Medium Sandstone Group, a fabric type which is characterised by crushed fragments of ferruginous sandstone, see Appendix D.2), but in others, it demonstrated that whilst ferruginous cemented sandstone were present in the fabric, they were minor constituents and should not be seen as the indicator which characterises that type. For example, ferruginous cemented sandstones were present in the fabric of sample ELAJ022 – classified as SSTFEC, but the fabric of this sample also contained sandstones with salacious cement, kaolinite cement, and calcareous cement. Thus, it was not the presence of one particular sandstone type that was significant, rather it was the overall petrology of the fabric. This sample was attributed to the Elsham Glacial Sand/Sandstone Group (see Appendix D.2). To summarise, then, although the samples ELAJ022 and MT006 and MT010 were all identified as being SSTFEC, petrology attributed them to very different petrographic groups. It is recommended here, that in future studies, in hand specimen, SSTFEC fabrics should be simply classified as SST and then petrology should be used to identify the range of different sandstone that are present in the fabric. This reiterates the point made earlier in the chapter, that any analysis of early Anglo-Saxon pottery should involve a petrographic study of the fabric types and it should not be restricted to hand specimen identification only.

Finally, SSTNL and ESGSNL fabrics were also recorded in hand specimen. North Lincolnshire Sandstone-tempered fabrics (SSTNL) are characterised by the

[3] That is not to say that there would be little merit in attempting to distinguish between the two if petrographic analysis was undertaken on pottery from Yorkshire. For example, in Yorkshire, we might find that potters operating from one site were obtaining their sandstone temper from an outcrop of coarse sandstone, whilst those from another were exploiting an outcrop of very coarse grained sandstone. Such a situation would have important implications for the provenance of the pottery. In the present study, however, the coarse and very coarse clasts were mixed together in glacial deposits, and thus there is no merit in attempting split the two.

presence of sandstone and a range of erratic fragments such as dolerite and plutonic igneous rocks. North Lincolnshire Early Saxon Greensand-tempered fabrics (ESGSNL) have a similar composition, but the sandstones in these fabrics are calcareous (see Perry 2009a). In thin section SSTNL samples were attributed to the Glacially Derived Sandstone Group whilst ESGSNL fabrics were largely attributed the Cleatham Calcareous Sandstone Group. The petrology revealed that rather than being distinct types in their own right, these hand specimen fabrics are simply different points along a continuous spectrum of proportions of erratic igneous material present in the boulder clays that were used to produce the clay pastes.

Discussion

Having identified the fabrics of almost 4000 vessels from North Lincolnshire, plotted the distribution of these types throughout the landscape, and within individual cemeteries, and examined 440 samples of these vessels in thin section, some very interesting patterns emerge which merit discussion; these patterns can be divided into four main themes. Firstly, the clay and temper types used by potters in early Anglo-Saxon North Lincolnshire generally follow the clay/temper traditions of Anglo-Saxon England as a whole. Secondly, patterns in the spatial distribution of fabric types within the study area are evident and these are complemented by spatial distributions of fabric types within the individual cemeteries. Third, through petrology it is possible to identify some of the settlements from which some of the pottery found in the cemeteries is likely to derive; this allows us to gain some insight into the catchment areas of these cemeteries. Finally, there are a small number of pots that occur considerable distances from their raw material sources, suggesting either a level of exchange and distribution, or that in some instances potters were travelling over considerable distances to obtain their raw materials. The following section explores these points in turn, placing specific emphasis on their significance for our understanding of Anglo-Saxon pottery production and distribution, and, in particular, the catchment areas and territories of early Anglo-Saxon cremation cemeteries.

The Anglo-Saxon Potting Tradition

The results of the analyses undertaken as part of the present study demonstrate that the same types of raw materials were used to make the pottery found in both cemetery and settlement contexts. For example, we see that sandstone, acid-igneous rocks, limestone and organic materials (SST, CHARN, LIMES and ECHAF fabrics, respectively) were used to temper the clays used to make the pottery occurring at settlements and cemeteries alike. Such materials were used as temper for pottery found at other cemetery and settlement sites far beyond the study area, including, for example, Sancton (Yorkshire) (Vince 2004), Brough, (Nottinghamshire) (Vince 2003a), Loveden Hill (Lincolnshire) (Williams 1987), Spong Hill (Norfolk) (Brisbane 1980), Barrow Hills (Oxford) (Blinkhorn 2007), and Mucking (Essex) (Mainman 2009). This observation tells us that the temper-types used by the potters of North Lincolnshire conform to the pottery traditions of the early Anglo-Saxon period more broadly.

To the similarities seen in temper-types we can add similarities in the use of specific clays. Indeed, thin section analysis reveals that although potters had a range of clay options open to them, potters within North Lincolnshire generally formed their vessels using boulder clays. Boulder clays appear to have been a common choice for the Anglo-Saxon potter; indeed, they were used in the production of pottery found at Skendleby (Lincolnshire) (Vince 2007b), Scorton Quarry (North Yorkshire) (Vince 2003b), Sancton (East Yorkshire) (Williams 1992), Willoughby-on-the-Wolds (Nottinghamshire) (Williams 1986), Spong Hill (Norfolk) (Brisbane 1980) and Cambridgeshire (Vince 2007c). Although the present study revealed that silty clays, probably obtained from alluvial deposits, and possible Jurassic clays, were utilised by some potters, their use was rare and largely, although not exclusively, restricted to the production of grass/dung-tempered (ECHAF) pottery and iron-pellet-tempered (FE) pottery. The association of fine, possibly Jurassic, and alluvial or lacustrine clays with the production of these fabric types is interesting. In a study of grass/dung-tempered pottery from Mucking (Essex) and Flanders, Hamerow *et al.* (1994, 11-12), noted that in both instances the potters utilised very fine clays. That there is an association between the use of a particular temper type and the use of specific clays demonstrates that these potters had a definite perception of how their clay pastes should be prepared and that it differed from that of their wider peer group.[4]

The Distribution of Fabric Types

Despite the fact that similar types of temper and clay were used by potters operating through the study area, patterns do emerge which demonstrate the preferential use of certain fabric-types in broad geographical areas. For example, at Cleatham iron-pellet tempered pottery (FE) accounts for 16% of the assemblage, yet at Elsham it accounts for just 4% (Table 5.1). The settlements surrounding these cemeteries generally reflect this differential use. For example, at Scotton (SNAC), FE fabrics account for 15% of 175 vessels; this site is just c. 5km west of Cleatham. Similarly, at Manton Warren (MTBX), c. 3km north of Cleatham, FE fabrics account for 8% of 498 vessels. In contrast, at Melton Ross (MRBD, MRBF, BBNB – these three find sites are all within 400m of one-another), just c. 3km from Elsham, FE fabrics account for just 1% of 156 vessels (see Appendix D.1 and Figure 5.4).

A similar pattern to that observed for iron-pellet tempered fabrics (FE) can be seen in other types of fabric, for example, in the distribution of North-East Lincolnshire Greensand Tempered-fabrics (NELESGS). Such fabrics accounted for less than 1% of the urn assemblage at Cleatham, but 18% at Elsham. At Manton Warren (MTBX), c. 3km north of Cleatham, this fabric type constitutes just 1% of 498 vessels, whilst at

[4] Thin section analysis provides insight into how the vessels were formed and fired. The preferred mode of forming was by coiling. That is, to say that coils are produced by rolling clay between the hands or on a flat surface and the resulting coils placed one on top of the other, building up the shape of the vessel. The coils are then joined by squeezing, smoothing, scraping and smearing (Rye 1981, 76). In thin section this method of forming can be recognised in a number of ways: the preferred orientation of clay minerals, voids and particulate inclusions (Reedy 2008, 180-4); the differential mixing of temper in separate coils (Reedy 2008, 180-4); and voids occurring at the junction of poorly bonded coils (Wardle 1992, 59; Reedy 2008, 180-4). Not only was this mode forming the preferred method for the potters in the study area, but it was common place throughout Anglo-Saxon England (for example see Vince 2007c; Brisbane 1980, 215; Vince 2002c, 202).

Thin section analysis also provides insight into the firing conditions of Anglo-Saxon pottery. Like the temper, clay, and forming techniques, firing conditions within the study area accord with those observed from Anglo-Saxon England more broadly. The optical activity of the groundmass (the clay) of samples in the present study demonstrates that the potters were not firing their vessels to high temperatures, probably in the region of 550-750^{o}C and certainly no higher than c.850^{0}C. Further to this, the presence of carbonised organic material in voids demonstrates that the vessels were not fired for a sufficient time to allow the organic material to fully burn out (see Reedy (2008, 185-6), Tite (1995) and Hodges (1963) for discussions on the determination and interpretation of firing conditions in thin section). Detailed discussions on the conditions of firing conditions of Anglo-Saxon pottery are rare, but when consideration has been given to them, short firing times and low firing temperatures appear to be norm. For example, Brisbane (1980, 215), records that the urns from Spong Hill do not appear to have been fired above 850^{o}C, and that normal firing conditions were likely to have been between 500-750^{o}C.

Mell’s Farm (MSAB), c. 4km north-west of Cleatham, this fabric type is absent from an assemblage of 265 vessels. In contrast, at Melton Ross, c. 3km from Elsham, NELESGS fabrics constitute 7% of 156 vessels (Appendix D.1).

Whilst the geology of North Lincolnshire can explain some of these distributions it cannot explain them all. For example, the ferruginous iron-pan forming Northampton Sands and the Pecten Ironstone member both crop out within 4km of Cleatham (Gaunt *et al.* 1992, 34-6, 40-5, 53-4). In contrast, the nearest ironstone to Elsham, the Claxby Ironstone, crops out c. 11km south of the cemetery (Figure 5.17). The distribution of iron-rich geological deposits can, then, account for the extensive use of iron-rich fabrics in and around Cleatham and their general absence from the locality of Elsham. Geology also accounts for the distribution of North East Lincolnshire Early Saxon Greensand tempered fabrics (NELESGS) or Early Saxon Mixed Greensand fabrics (ESMG). The source of the raw material in these fabric types lies in the Spilsby Sandstone and as this sandstone is located on the Wolds, just south of Elsham, it is unsurprising that these fabrics are common in and around Elsham but not at Cleatham (Figure 5.13). Geology cannot, however, account for differences in the use of grass or dung (ECHAF fabrics) as a tempering material. Such fabrics accounted for 1% of the assemblage at Elsham, but 6% at Cleatham. Concurrently, ECHAF fabrics are rarely found in assemblages from sites around Elsham (Figure 5.1), yet they are common in the assemblages of non-funerary sites around Cleatham, accounting for 13% of vessels from Scotton (SNAC), 12% from Middle Manton (MTFW), and 8% from Manton Warren (MTBX) (Appendix D.1). This is an intriguing disparity as, unlike ironstones, or the Spilsby Sandstone, dung would be readily available to potters on both sides of the River Ancholme; geology, therefore, cannot explain this distribution pattern.

The patterns observed in the differential use of certain raw materials are not dictated simply by a site’s location with respect to the River Ancholme. For example, as we have already discussed, while limestone-tempered fabrics (LIMES, see above) are more common at sites to the west of the River Ancholme, close to a plethora of limestones and their various outcrops, these limestone-tempered fabrics are considerably more common in the north-west of the study area than in the south-west (see LIMES discussion above and Figure 5.22). There are a number of other distribution patterns that reveal that many sites within very close proximity of one-other display considerable differences in the frequencies of certain fabric types. This can be demonstrated by considering the sites of Scotton (SNAC), Manton Warren (MTBX), and the cumulative finds from Mell's Farm (three separate find instances, MSAB, MSMB, and MSHB), which are within 3-6km of one-another (Figures 1.20 and 1.21b). Iron-pellet tempered fabrics (FE) are common at all three; they account for 15% of vessels at Scotton, 8% at Manton Warren, and 6% at Mell's Farm. A similar pattern is observable in the use of sandstone-tempered fabrics (SST), which account for 22%, 15%, and 20% of the assemblages by vessel count, respectively. One might expect, then, that if another fabric type was considered, such as dung-tempered fabrics (ECHAF), that we would see similar quantities represented. This is not the case, whilst ECHAF fabrics account for 13% of the Scotton assemblage and 8% at Manton Warren, they account for just 0.16% of the assemblage from Mell's Farm (Appendix D.1 Figure 1.21(b)).

Such differences in the proportions of fabric types found at sites that are within just a few kilometres of one-another are not restricted to the use of dung. This is demonstrated by comparing the cumulative assemblage of 108 vessels from Crosby Warren (three find instances - CRWA, CRWE, CRWB), with the assemblage of 115 vessels from the settlement site at Burton-upon-Stather (BSAE); these sites are just 3km from one another (Figure 1.21(a)). At Crosby Warren, sandstone-tempered fabrics (SST) account for 31% of the assemblage, local sand fabrics (ESAXLOC), 55%, and dung tempered pottery (ECHAF), 9%. At Burton-upon-Stather, we see a similar proportion of ECHAF pottery (12%), but there are considerable differences in the occurrence of SST and ESAXLOC; they account for 8% and 36%, respectively. Thus, despite the proximity of these two sites, sandstone tempered fabrics are four times as common at Crosby Warren as they are at Burton-upon-Stather. In a similar vein, only 2% of the pottery from Crosby Warren is tempered with igneous inclusions (CHARN-type fabrics), whilst igneous rock-tempered pottery accounts for 18% of the Burton-upon-Stather assemblage (see Appendix D.1).

To summarize, then, we see two related patterns emerging. Firstly, there are differences in the use of certain fabric-types at settlement sites on either side of the River Ancholme and these differences are reflected in the cemetery assemblages. Whilst some of these frequencies can be accounted for geologically, others cannot. Secondly, despite the fact that certain fabric types are more common on one side of the river than the other, not every site conforms to this general pattern. For example, ECHAF fabrics are common to the west of the river, but are rare to the east. The site of Manton Warren (on the west side of the river) follows this pattern, with ECHAF accounting for 8% of the assemblage. In contrast, 3km away at Mell's Farm, ECHAF fabrics account for just 0.16%. It would appear that, as Russel (1984), Blinkhorn (1997) and Vince (2008) have suggested, rather than being dictated by geological constraints the Anglo-Saxon potter's choice of temper was a cultural one.

This differential use of fabric types within the study area, and in particular, between sites that are in very close proximity to one-another, can be seen to manifest itself in the spatial distribution of fabric types at the studied cemeteries. For example, sandstone-tempered (SST) ceramics were the most commonly occurring type at Cleatham and they are seen to be evenly distributed across the entire burial area (Figure 5.29). On the contrary, a plot of the lesser used ESMG (the coarse calcareous sandstone-tempered fabric) reveals that almost half of the urns of this type are confined to a c.12x16m area on the west of the cemetery (Figure 5.8). Similar patterns can be seen in the distribution of grass/dung-tempered and iron-pellet tempered pottery (ECHAF and FE). Although they occur across the entire site, FE fabrics are concentrated in the north of the main burial area and thin out towards the south; in particular, there is a very dense concentration of this fabric on the north western-edge of the cemetery. A comparison of this distribution with that of the ECHAF fabrics reveals that whilst both fabrics are common, and relatively evenly distributed across the site, in the northern half of the cemetery ECHAF fabrics are confined to the eastern edge (Figures 5.2 and 5.5).

Consideration of the distribution of fabric types at Elsham reveals similar patterns to those observed at Cleatham. For example, (Figure 5.29) sandstone-tempered fabrics (SST) are evenly distributed across the cemetery. Vessels tempered with igneous rock inclusions (CHARN) are largely absent from the south-eastern quarter of the cemetery, but this is an area where calcareous sandstone-tempered fabrics (SSTCAC) are frequent; indeed, the distribution of this fabric type forms a crescent shaped distribution along the southern and eastern edge of the cemetery (Figures 5.10 and 5.20). The second and third most common fabric types at Elsham are NELESGS and ESMG (Table 5.1) and the distributions of these types are clearly related. Both occur most frequently in the western half of the cemetery and particularly in the south-western ditch (Figures 5.8 and 5.14). Thin section analysis demonstrates that the raw materials used in tempering NELESGS and ESMG fabrics derive from the same parent rock (see above). The relationship that exists between the sources of the raw materials used to make these fabric types, therefore, accords with the spatial distribution of these fabrics types within the cemetery. Further distribution patterns are observable by considering Elsham's lesser fabric types of ECHAF, LIM and LIMES (dung, oolitic limestone, and limestone tempered fabrics, respectively). The limestone groups are concentrated in the eastern half the cemetery, whilst the dung-tempered pottery occurs more commonly in the west (Figures 5.2 and 5.23). As discussed at the beginning of this chapter, the fact that specific fabric types occurred more frequently in some areas of cremation cemeteries than others, is something that is being increasingly noticed in the analysis of cemetery material (see above and Mainman 2009, 589-90; Timby 1993, 273; and Russel 1993, 110). It is suggested, then, that in combination, the distribution of fabric types in North Lincolnshire along with the distributions within individual cemeteries, demonstrates that certain communities preferred to use certain temper types over others and that these communities were then burying their dead in community-based areas within the cemeteries. We must now question, then, whether we can relate the pottery from specific settlement sites to that in the cemeteries and thus recognise the settlement sites that were using these cemeteries, and in particular identify the catchment areas of these cemeteries.

Cemetery and Settlement Relationships: The Shared Use of Raw Material or the Distribution and Exchange of Pottery

As the results presented above reveal, there are three types of relationship between the pottery found at settlements and cemeteries. In the first instance, there are the examples where two or more fabric samples from different non-funerary sites were identified as being identical to one another. Secondly, there are the cases where a pot from a settlement is identified as being of identical fabric to one or more from a cemetery. Finally, we have those instances where the fabric from two or more pots, from different cemeteries, is shown to be identical. We must consider each of the three relationships in turn if we are to gain an understanding of the level of movement of pottery throughout the North Lincolnshire and specifically the catchment areas of the cemeteries of Elsham and Cleatham.

As the ceramic fabric of a number of samples from different settlement sites are identical to one-another, we must ask the following: were potters who were operating at different settlement sites, whether in close proximity to, or distant from each other, sharing the same clay and temper sources, or were pots being exchanged and distributed between sites? In answering this question we must first consider the locations of the sites where identical fabrics were identified in respect to the locations of sources of raw material. As was discussed above, the sites of Scotton (SNAC) and Manton Warren (MTBX) have relatively large assemblages of iron-pellet tempered pottery (FE). Manton Warren lies just 6km north-east of Scotton (Figure 5.4). Three thin section samples taken of this fabric from these two sites are identical (samples GP084, GP085 and GP094 – the first two derive from Manton Warren and the latter from Scotton – Figure 5.6). All three samples are tempered with iron-rich pellets and are made with very fine boulder clay. Whilst the Frodingham Ironstone and the ferruginous Thorncroft Sands are part of the bedrock geology close to these sites, and might be considered as a source of iron pellets, neither is known to be exposed in their immediate vicinity (the Frodingham Ironstone is exposed close to Burton-upon-Stather, c. 10km north of Manton Warren, and the Thorncroft Sands is exposed at Hibaldstow, c. 5km east of Manton Warren (Gaunt *et al*. 1992)). In contrast, both the Pecten Ironstone and the iron-pan forming Northampton Sand are exposed *between* the two find sites; the Pecten crops out west of Middle Manton [SE 9275 0347] and the Northampton Sand appears as small bluffs and above springs at Manton [SE 9347 0270] (Gaunt *et al.* 1992, 39, 44-5). Thus, whilst it is possible that these three samples were made at a single place and were then disseminated by some means to other sites, there is also a distinct possibility that the potters operating at Manton Warren and Scotton were sharing a set of raw materials.

Much ethnographic work has been conducted to explore the distance that potters travel from their homes, and points of pottery production, to clay and temper sources; this work helps to shed some light on whether these Scotton and Manton Warren pots were moving or whether raw materials were being shared. Dean Arnold (1985, 38-52) surveyed 111 pottery producing societies (from Spain through to Guatemala, Mexico, Peru, Cameroon, Lebanon, America, Pakistan, Alaska, Nigeria, Philippines, to name but a few) and determined that 33% of potters obtain their clay within 1km of the production site, whilst 84% obtain it within 7km.[5] He also demonstrated that the distances that potters travel to obtain temper materials are very similar to those of the clay; 52% obtain their temper within 1km, 88% within 6km, and 97% with 9km. Olivier Gosselain (1994, 100-1) undertook a similar analysis to Arnold, demonstrating

[5] It is worth noting here that those potters who obtain their raw materials from within these limits tend to travel on foot or use animals. Those collecting from beyond the upper threshold often use motorised transport and ox/horse-drawn carts. In addition, when travelling beyond this upper threshold, the potters tend to collect large quantities of raw materials, even a whole year's worth of raw materials in a single trip (Arnold 1985, 55).

that in a study of 82 potters in 21 ethnolinguistic groups in Northern Cameroon, that potters travelled on foot to collect their raw materials and that 95% obtained their clay within 3km of the production site. With this evidence in mind we can begin to determine whether the Scotton and Manton Warren pots were produced at a single source and then distributed, or whether potters at the two sites were sharing raw materials. Given that Scotton and Manton Warren are just 6km apart, and that the iron-pan forming geologies used as temper crop out between the two sites, it is entirely possible that raw materials were being shared. When we consider that the level of production of pottery in early Anglo-Saxon England is at the individual household (see for example, Russel 1984), and as both sites use this fabric type extensively (see above and Appendix D.1), it is not just possible, it is in fact probable, that the Scotton and Manton Warren potters were sharing raw material sources.

A similar sharing of raw materials can be suggested with samples that are tempered with other types of inclusion. Samples GP077 and GP109 are identical in thin section; both are tempered with igneous rock and petrographically belong to the Cleatham Granitic Group (see Appendix D.2 and Figure 5.21). These samples derive from Mell's Farm (MSAB) and Manton field-walked site OS0034; these two sites are separated by just 3km. Samples GP080 and GP054, both tempered with locally derived sands are also identical in thin section. As the find spots from which they were obtained are just 0.5km apart (Manton Warren and field-walked site Manton 3, MTBX and MTCC, respectively) it is quite likely that the potters were sharing raw material sources.

The situation becomes a little more complicated when the distance between sites where identical samples have been identified increases. In such instances, we must begin to consider that, rather than the raw material sources being shared by potters, it was the finished pots that were moving. For example, samples GP045 and GP055 are identical; they were obtained from two sites c. 14km apart (Burton-upon-Stather (BSAE) and Manton Site 3 (MTCC), respectively) (Figure 5.33). If the raw materials were obtained at a point roughly equidistant (c.7km) from these two sites, then there is a possibility that the potters from these two sites were sharing resources, but we are beginning to reach those maximum distances that potters are prepared to travel to obtain raw material (Arnold 1985, 38-55).

Samples GP006 and GP025 were obtained from east of the River Ancholme, at Barton-upon-Humber (BNAM) and Melton Ross (MRBC), respectively. These samples are tempered with the calcareous Spilsby Sandstone which crops out c. 6km south of Melton Ross. Barton-upon-Humber is 12km north of Melton Ross; thus, if the potter responsible for the Barton-upon-Humber samples resided at Barton-upon-Humber, then they would have had to travel a minimum of 18km to obtain their raw materials (it must be borne in mind that the distances expressed here are taken from a two dimensional map and are 'as the crow flies' and probably considerably underestimate the real distance that the potter would have to travel). As this is twice the maximum distance of 9km that 97% of potters will travel to obtain their raw materials, at least according to ethnographic parallels (Arnold 1985, 38-55), it is highly likely that this Barton-upon-Humber sample was transported northwards from a manufacturing site close to Melton Ross, if not from Melton Ross itself.

Melton Ross also features in relationships with iron-pellet tempered samples from Scotton and Manton Warren (Table 5.2) (samples GP084, GP085 GP094 and GP022). We have already discussed the likelihood that the potters from Manton Warren and Scotton were exploiting the same raw material sources to produce iron-pellet tempered fabrics, and that the raw material sources probably lay between the two sites. As Melton Ross is 15km from Manton Warren and 21km from Scotton, and across the River Ancholme, it is well beyond Arnold's (1985, 38-58) 9km distance from which 97% of potters obtain raw materials. It is highly likely, then, that this Melton Ross sample was transported eastwards to Melton Ross from a manufacturing site very close to, if not from, Scotton or Manton Warren. Looking in the opposite direction, from Scotton towards Melton Ross, we see the relationship reciprocated. Sample GP093 from Scotton is identical to two samples from the latter site (GP039 and GP040) (Figure 5.13). These samples are tempered with Spilsby Sandstone, and thus all have their origins in the geology and raw materials in or close to the 'catchment area' of Elsham. It would seem, then, that, once more, pottery was being moved around the landscape and that the Scotton and Manton Warren pots were obtained from a manufacturing site on the Wolds.

In summary, in almost all cases where the fabric of samples from two or more settlement sites have been identified as being identical it is likely that the potters were producing at the level of the household and were sharing raw materials that were available in the locality of their settlements. There are, however, a very small number of instances for which the sharing of raw materials is unlikely and that in these cases it is probable that pottery was moving between sites. Having considered the relationships that exist between the pottery found at different non-funerary find sites, we must now focus on instances of identical samples that derive from non-funerary find sites and a cemetery, respectively, and might thus shed light upon the catchment areas of these cemeteries.

The distribution of non-funerary pottery find sites in North Lincolnshire suggests that each of the large cremation cemeteries lay at the heart of discrete settlement clusters. We might suggest, then, that these cemeteries are, as Williams (2002b) discussed, central places with their own catchment areas. The distribution of these non-funerary find sites with respect to the cemeteries of Cleatham, Elsham and the now destroyed Bagmoor, suggests that each of the cemeteries had catchment areas with radii of c.5km (Figure 1.20). Whilst these two-dimensional distributions do allow us to suggest that a relationship existed between a cemetery and particular settlement within its catchment area, they do not allow us to demonstrate that this relationship existed. Petrographic analysis of the pottery from these sites does, however, allow us to do so, and Table 5.2 summarises the ceramic relationships between individual non-funerary finds sites and cemeteries that were identified in the foregoing discussion of individual fabric types. As the table demonstrates, in most cases where a settlement sample is identical to a cemetery sample the settlement lays within the c. 5km radius of the relevant cemetery. We are, therefore, through this analysis, being provided with a window in to the extent of the territories and catchment areas served by these cemeteries. Moreover, as pottery production was at the level of the individual household, using raw materials available within just a few kilometres of the settlements, we can actually begin to relate specific settlements to individual cemeteries.

Whilst the majority of samples from settlements that are linked to those in cemeteries lie within c. 5km of the respective cemetery, there are a small number of identical samples in the cemeteries which appear to have travelled from well beyond the 5km radius, and in some cases up to 20km. For example, samples ELAJ069, ELAJ086, ELAJ013, ELAJ018, ELAJ089, and ELAJ085, from Elsham, all have their origins in the sites and geology in the 'catchment area' of Cleatham (Table 5.2). In contrast, the origins of samples MT008, MT012, MT069, MT085, MT089, MT091, MT092 and MT096 from Cleatham lie in and around the 'catchment area' of Elsham (Table 5.2). To this small group of pots that appear to have been transported over relatively large distance, we can add the single sample that appears to come from the Yorkshire Wolds, north of the Humber Estuary (Figure 5.24 – see LIMES discussion above) and those that might derive from southern and central Lincolnshire; in particular, samples MT013 and ELAJ117 (from Cleatham and Elsham) appear to have their origins close to, or south of, South Elkington (see ELFEOL and ELQFE above).

Site Code	Sample Number	Distance Between Non-Funerary Find Sites	Identical Cemetery Samples					Locality of Production
			Cleatham	Distance from Non-Funerary Find Site to Cleatham	Elsham	Distance from Non-Funerary Find Site to Elsham	Distance from Cemetery to Cemetery	
SNAC	GP095		MT111, MT125, MT131	5				Cleatham
BSAA	GP015		MT123	16				Cleatham
MSAB	GP075		MT126	4	ELAJ069	16		Cleatham
MTBX	GP079		MT130	3				Cleatham
BSAE	GP043		MT193, MT195, MT196	16				Cleatham
MTFW	GP103		MT122	3.5				Cleatham
MRBF	GP022	MRBF to: SNAC = 21km : MTBX = 15km	MT106, MT108, MT110, MT112	16.5				Cleatham
MTBX	GP084, GP085	MTBX to SNAC = 6km	MT106, MT108, MT110, MT112	3				Cleatham
SNAC	GP094	MTBX to SNAC = 6km	MT106, MT108, MT110, MT112	5				Cleatham
MRBF	GP025	MRBF to BNAM = 12km						Elsham
BNAM	GP006	MRBF to BNAM = 12km						Elsham
MRBF	GP033				ELAJ122	3.5		Elsham
MRBF	GP032, GP028	MRBF to WORAC = 7km			ELAJ129, ELAJ130	3.5		Elsham
WORAC	GP069	MRBF to WORAC = 7km			ELAJ129, ELAJ130	3.5		Elsham

Site Code	Sample Number	Dist Between Non-Funerary Find Sites	Identical Cemetery Samples					Locality of Production
			Cleatham	Distance from Non-Funerary Find Site to Cleatham	Elsham	Distance from Non-Funerary Find Site to Elsham	Distance from Cemetery to Cemetery	
HBBB	GP021		MT090	3.5				Cleatham
MRBD	GP039, GP040	MRBD to SNAC = 21km			ELAJ013, ELAJ116	3.5		Elsham
SNAC	GP093	MRBD to SNAC = 21km			ELAJ013, ELAJ116	20		Elsham
MTBX	GP087				ELAJ018	14		Elsham
MSAB	GP077	MSAB to OS0034 = 3km						Cleatham
OS0034	GP109	MSAB to OS0034 = 3km						Cleatham
MSAB	GP071		MT070, MT078, MT165, MT189	4	ELAJ089	16	16	Cleatham
MTBX	GP078, GP082, GP086		MT075, MT080, MT144	3	ELAJ085	16	16	Cleatham
BBAL	GP003		MT008	14				?Elsham
BSAE	GP045	BSAE to MTCC = 13km						Cleatham
MTCC	GP055	BSAE to MTCC = 13km						Cleatham
MTCC	GP054	MTCC to MTBX = 0.5km						Cleatham
MTBX	GP080	MTCC to MTBX = 0.5km						Cleatham
BSAE	GP047				ELAJ104			Cleatham

Site Code	Sample Number	Dist Between Non-Funerary Find Sites	Identical Cemetery Samples					Locality of Production
			Cleatham	Distance from Non-Funerary Find Site to Cleatham	Elsham	Distance from Non-Funerary Find Site to Elsham	Distance from Cemetery to Cemetery	
MTBV	GP050		MT139	3				?
MRBD	GP027		MT136	16				Cleatham
WHA	WHA15				ELAJ027	16		West Halton
OS8500	GP104	OS8500 to MRBD = 16km						Cleatham
MRBD	GP036	OS8500 to MRBD = 16km						Cleatham
			MT085		ELAJ009	16		Elsham
			MT013		ELAJ117	16		Wolds
			MT150		ELAJ111	16		Cleatham
			MT012		ELAJ010	16		Cleatham
			MT116		ELAJ086	16		Cleatham

Table 5.2: Petrographic links identified between non-funerary find sites and cemeteries. Shaded records indicated petrographic links between pottery from different non-funerary sites, e.g. sample GP054 and GP080 are from MTCC and MTBX but they are identical.

The Scale of Ceramic Movement

One might be surprised to find that so many pots appear to have been moved around the North Lincolnshire landscape. This is just a result of the scale of the sampling strategy; indeed, of the 440 thin sectioned samples, only c.4% of the samples from each of the cemeteries appears to derive from a site outside of the cemetery's c.5km catchment area. As demonstrated by Table 5.2, and the discussion above, there are a similarly small number of pots from the non-funerary find sites that appear to have to have been obtained from production sites in excess of c.15km away. None the less, the fact that these pots had moved, and specifically that pots that appear to have been transported over relatively long distances are found in both settlement and cemetery assemblages, is of interest.

In recent years, the literature produced regarding the provenance of Anglo-Saxon pottery has begun to demonstrate, although admittedly very rarely, that some pottery might have been moving considerable distances. In the analysis of Spong Hill, for example, Brisbane (1980, 214-15) writes 'all [fabric] groups except VII and IX originated from the drift derived sources in the Spong Hill area ... [these two groups are] of non-local origin, although again precise source determination is not possible'. Notably, one of the pots belonging to these 'non-local' groups was attributed to Spong Hill Stamp Group 5. Pots belonging to this stamp group have been recognised beyond Spong Hill, at other cemeteries in Norfolk; this, Brisbane argues, supports the idea of non-local manufacture of these groups (Brisbane 1980, 215; Hills 1980, 204). Further support for the argument that there was a movement of Anglo-Saxon pottery can be found in the work carried out on pottery from the cremation cemetery of Heyworth, near York (Yorkshire) (Vince 2008; Vince *et al*. 2008, 9). Whilst petrographic analysis suggests that 32 of 34 sampled vessels were probably produced within a few miles of York, the remaining two appear to have been produced at least 18km away. To these transported pots, we can also add the Leicestershire produced Charnwood-type fabrics that were discussed earlier in this chapter. Indeed, whilst Ixer and Vince's (2009) work on materials from Yorkshire demonstrates that the scale of distribution of this type might not be as large as previously thought, the fact remains that there are pots that have been found in Yorkshire that are likely to derive from Leicestershire. It is worth reiterating the point here, however, that of the granitic rock-tempered (CHARN-types) samples examined in this study, not a single one could be attributed to a potential

Leicestershire source. In the following chapter we will consider the processes that might have facilitated the movement of this pottery.

Chapter Summary

This chapter has presented the results of a large scale analysis of the early Anglo-Saxon pottery from North Lincolnshire's non-funerary sites and the cremation cemeteries of Elsham and Cleatham. It has shown that by classifying the pottery according to a standard type-series and plotting the distribution of specific fabric types, it is possible to gain insight into the production habits of potters operating in different locations within the study area and also the way that the cemeteries in which they buried their dead were organised. There are clear patterns in the distribution of certain fabric types in the north of the county and whilst geology can explain some of these it cannot explain them all. For example, the use of dung as a tempering material was popular at sites close to Cleatham, but very unpopular at sites around Elsham.

Whilst some fabric types appear in roughly equal proportions at a number of neighbouring settlement sites, suggesting that sites within close proximity of one another were producing pottery according to similar traditions, others, often just a few kilometres away, do not follow these patterns even though their potters probably had access to the same raw materials. These results accord with the suggestions of a number of authors (Blinkhorn 1997; Russel 1984, Vince 2008), that the choice of temper in early Anglo-Saxon England was a cultural one, and one that was deeply imbedded within the *habitus* of society. In spite of this, the raw materials used to make the pots in most cases appear to have been obtained from within just a few kilometres of the sites in which they were found.

To the distributions of fabric-types at non-funerary sites we can add the distributions of fabrics within the cemeteries themselves. Whilst many fabrics types were frequently used and evenly distributed across the cemeteries, some of the lesser used types undoubtedly concentrate in specific areas of the cemeteries. These concentrations, in conjunction with the distribution of types across North Lincolnshire as a whole, suggest the use of certain areas of the cemeteries by specific communities. Furthermore, by examining samples of cemetery and settlement pottery in thin section, it has been shown that we can begin to identify the settlements from which the pottery in the cemeteries might have originated. In particular, by combining ceramic evidence with geospatial plots of find sites with respect the cemeteries we can begin to understand the catchment areas and territories served by these cemeteries. Finally, a small number of pots within the funerary assemblages appear to have been obtained from outside of the cemeteries' catchment areas; this opens up the possibility of low level exchange. Pots that appear to have travelled distances in the region of c. 20km from their places of production are not restricted to the assemblages of cemeteries. Indeed, a small number of samples taken from the non-funerary sites are demonstrably the same as others that were produced at other non-funerary sites as far as 20km away. The motivating factors behind this small scale movement of pottery will be examined in the following chapter.

Chapter 6

Discussion

Introduction

This thesis has sought to address the broad themes of enquiry that were identified in Chapter 1, namely: whether cremation urns were made specifically for the funeral or were re-used domestic vessels; whether an analysis of the decoration employed on cremation urns, and the ceramic fabrics from which they were made could provide greater understanding about how burial was organised in cemeteries; and, finally, by comparing the fabrics of pottery found at cremation cemeteries with that found at non-funerary sites whether a greater understanding of the modes of production of early Anglo-Saxon pottery, the 'catchment areas' that these cremation cemeteries served, and the level of exchange of pottery in early Anglo-Saxon North Lincolnshire could be gained. The following discussion draws together the results of the various strands of analysis, highlighting what each strand contributes to our understanding of mortuary practices and the production and use of pottery in early Anglo-Saxon North Lincolnshire. The discussion is structured in a similar fashion to that in which the preceding chapters of the thesis were largely arranged. First, the evidence for pre-burial use of cremation urns from Elsham and Cleatham is discussed, along with the functions that the various vessel forms might have fulfilled in the production and consumption of fermented produce. Consideration is then given to the decoration of cremation urns, with emphasis being placed on the similarities and differences in proportions of decorative types seen at the cemeteries and what the spatial distributions decorative types might tell us about mortuary organisation.

Discussion then turns to ceramic fabric and in particular how the types of fabrics from Elsham and Cleatham compare to one another and how they compare to the fabrics of pottery recovered from the non-funerary find sites that surround them. Finally, the spatial distributions of fabric types within the study area and the individual cemeteries themselves are discussed and the notion that cremation cemeteries served large catchment areas and were at the centre of tribal territories is reviewed. As thin section analysis demonstrated that a small proportion of each of each cemetery's pottery came from sites which are outside of the cemeteries' respective catchment areas, the factors that might have influenced this relatively long-distance movement of pottery will be explored. Finally, this chapter considers the reasons why vessels with such specific functions were chosen to contain the remains of the dead.

The Pre-Burial Origins of Cremation Urns

For at least the last seven decades the majority of Anglo-Saxon scholars have believed that cremation urns were produced specifically for the funeral. As discussed in Chapter 1, three main strands of evidence have been employed to support this conclusion: significant differences in the proportions of decorated pottery at settlements and cemeteries; little evidence for pre-burial use (in the form of sooting) on cremation urns; and correlations between the size and decoration of cremation urns and the age, gender and status of individuals whose remains they contained. However, a critical evaluation of each of these pieces of evidence revealed that none are able to substantiate the claim that cremation urns were produced specifically for the funeral (see Chapter 1).

In Chapters 1 and 2 it was argued that, since not all pots are used for cooking, we need to look beyond the presence or absence of sooting if we are to ever understand how pottery was used in early Anglo-Saxon England and, in particular, if and how cremation urns might have been used before they were selected for burial. As a consequence of this argument, an extensive programme of use-alteration analysis, following the methods of Hally (1983), Skibo (1992) and Arthur (2002; 2004), was conducted on the pottery from the cemeteries of Elsham and Cleatham and also on that recovered from the non-funerary find sites that surround them. This demonstrated that at least 71% of the cremation urns from Elsham and Cleatham showed signs of having been used prior to their burial. This analysis also revealed that around a third of urns possess use-alteration characteristics indicative of the production and consumption of produce fermented by lactic acid such as beer and ale. By comparing the occurrence of different use-alteration characteristics with the presence and absence of decoration, it was demonstrated that decoration is directly linked to pre-burial function. Indeed, at both Elsham and Cleatham, internal pitting, indicative of fermentation, occurred more frequently on decorated pottery than it did on undecorated pottery. For example, at Cleatham 36% of complete decorated urns were internally pitted, compared to 13% of complete plain urns, whilst at Elsham 24% of complete decorated urns were internally pitted, compared to 13% of the complete urns (Figure 1.20). In contrast, at both Elsham and Cleatham, 25% of complete undecorated urns were sooted, compared to just 1% and 3%, respectively, of the complete decorated urns (Figure 2.21).

A key question that had to be answered in light of these new findings, then, was whether these use-alteration characteristics developed as a result of short-term funerary feasting or long-term domestic use; it was concluded that the latter situation is more likely. This is because osteological and ethnographic evidence suggests that the time between death, cremation and burial in early Anglo-Saxon England was relatively short and perhaps no more than a few days (see for example Gurdon 1914; ManiBabu 1994; McKinley 1994, 79, 85-6, 102, 119; Vitebsky 1993), which is unlikely to have allowed sufficient time for the internal pitting to have arisen from fermentation. Indeed, ethnographic and historical accounts of the brewing of un-hopped beverages (hops were not introduced to England until c. AD 1400, see Chapter 3) demonstrate that the process normally takes two to eight days, and that these beverages had to be consumed within a few days of manufacture. We can suggest, then, that if urns were being made for the funeral only a handful of brews could have been made in these vessels before they were buried (see Chapters 2 and 3, and also Clark 1983, 24; Corran 1975, 42-4; Stone 2006, 16). As such, unless the Anglo-Saxons were producing produce fermented with lactic acid with a pH akin to battery acid and intentionally grinding down the bases of their vessels then there is little chance that the levels of attrition seen on some of these urns would have had time to develop if they had been made for the funeral. It seems likely, then, that these urns were re-used domestic vessels.

Further support for the notion that cremation urns were re-used domestic vessels can be found in the evidence provided by the use-alteration analysis of pottery from settlement contexts. Indeed, the examination of pottery from 80 early Anglo-Saxon non-funerary finds-sites in North Lincolnshire revealed the same range of use-alteration characteristics identified on the cremation urns from Cleatham and Elsham. Like the cemetery assemblages, sooting was more common on plain vessels, whilst internal pitting was more common on decorated vessels. Whilst the proportions in which these characteristics occur are different from those seen in the cemeteries (Chapter 2), they do, none the less, demonstrate that cremation urns were used in exactly the same way as pottery used in domestic contexts. Although use-alteration analysis has never previously been conducted on any other assemblages of Anglo-Saxon pottery, consultation of excavation reports from a selection of sites suggests that the range of characteristics noted in this study are not restricted to pottery from North Lincolnshire. Indeed, it seems that internal pitting also occurred on urns from the cemetery of Millgate (Newark-on-Trent, Nottinghamshire) and the settlement of Mucking (Essex) (see Chapter 2; Hamerow 1993; Kinsley 1989). However, due to a lack of consistency in the recording of the condition of vessel surfaces at these sites, we cannot fully appreciate the extent to which this phenomenon was happening outside of North Lincolnshire.[1]

With the prospect that urns were not made specifically for the funeral, a number of characteristics of these 'funerary' vessels and 'rituals' that are associated with them needed to be reconsidered. First to be addressed was the commonly expressed belief that post-firing perforations (PFPs) – holes made in the bases and lower walls of cremation urns after they have been fired – and lead-plugged PFPs, were a means of ritually 'killing' and dedicating urns to the dead (for example, Richards 1987, 77). Consultation of a range of archaeological reports demonstrated that this form of post-firing modification was not a tradition peculiar to the early Anglo-Saxons. Indeed, this practice is traceable from at least the middle Iron Age, through to the later medieval period, and, indeed, up to the early twentieth century (Chapter 2, see also Perry 2012). Moreover, historical accounts reveal that PFPs are principally functional and allow vessels to be utilized in a range of food and drink processing activities, particularly those that involve the separation of solids from liquids in the production and consumption of fermented produce. It was encouraging, therefore, to find that internal pitting, indicative of fermentational processes, occurred more frequently on urns with perforations than those without. Indeed, at Cleatham, 43% of perforated urns were internally pitted, compared to 26% pitted without a perforation; a similar pattern was observed at Elsham. Although few PFPs were identified among the pottery assemblages from the non-funerary finds sites – just two PFPs, in fact – their presence amongst assemblages of pottery from non-funerary sites clearly demonstrates that PFPs are not a phenomenon peculiar to cemeteries. A further aspect of PFPs is that some were plugged with lead. In Chapter 2 it was argued that there is a high probability that all PFPs were plugged at the time of burial, but we are unable to see this in the archaeological record due to them being plugged with perishable materials, such as wood, cloth, leather or wax. Conclusive evidence that materials other than lead were being used to plug these vessels is attested by the presence of a clay plug in Elsham urn EL76GJ (Figure 2.24); the presence of lead plugs in PFPs, then, is simply the result of material choice or availability.

[1] Although we must credit Kinsley and Hamerow for their foresight in making an attempt to record details about condition of vessel surfaces; such a level of recording is conspicuous in its absence from most cemetery reports.

Form and Function

Having explored the pre-burial functions of cremation urns it was necessary to reconsider their forms. Myres believed that there were an ‘infinite series’ of forms, that ‘each of the main [form] groups merge imperceptibly into others’, and that it would be foolish to expect potters to produce ‘clear-cut ... well-defined ceramic types’ (Myres 1969, 22-25; 1977, 1-2). It was demonstrated in Chapter 3, however, that the factors that Myres, and many subsequent analysts (for example, Fennel 1964; Hamerow 1993), focused on as a means by which to classify early Anglo-Saxon pottery actually detract from the significance of overall vessel form. Indeed, the main focus has almost always been on the shape and position of a vessel’s shoulder − for example, rounded, biconical, or sub-biconical. By examining a range of ethnographic studies of vessel form, it was demonstrated that the shape and positions of vessel shoulders should be viewed as ‘micro-style’ variants; that is that they are simply localised concepts of wider vessel forms that develop out of learning patterns, social relationships and motor habits of potters (see Dietler and Herbich 1989; 1994). For example, a community of potters might make water jars with wide voluminous bodies, narrow restricted necks, and rounded shoulders. In contrast, a neighbouring group might make water jars of similar dimensions and volume, but in this case the shoulders are biconical. A Myresian approach to the study of these vessels, focusing on the shape of the shoulder, would therefore ignore the major similarities between them and seriously inhibit our understanding of vessel form. Thus, it was argued that the shoulders of vessels should be seen as subordinate to overall vessel form.

In an attempt to understand the forms of Anglo-Saxon pottery, Chapter 3 presented a survey of ethnographic literature, which focused specifically on the way that pottery-producing and -using societies classify their pottery and on the cognitive decisions that pottery users and producers make in distinguishing between their functional classes of vessels. It demonstrated that pottery users predominantly classify vessels according to intended function − for example, as storage jars, water jars, pickle jars and rice or vegetable cooking pots − but that morphological characteristics, particularly the ratios of height-to-width, and rim diameter-to-maximum diameter, and also vessel capacity, are also extremely significant concerns when distinguishing between types. Using these three characteristics a new typology of Anglo-Saxon vessel form was developed.

The typology, presented in Chapter 3, consists of six main groups, each of which is subdivided according to minor differences in ratio of height-to-width. Further division is made on account of vessel size. Looking at form in this way demonstrated that potters held clear mental templates as to the types, sizes and shapes of vessels that should be produced. Indeed, a comparison of the form-types represented at the cemeteries of Elsham and Cleatham revealed that the same types were present at both and that the characteristics of each form-type were almost identical at both cemeteries. For example, the average volume of form-type 1Di at Elsham and Cleatham was 4.30 litres and 4.25 litres, respectively, whilst the average rim diameter was 116mm and 125mm respectively.

Given that ethnographic studies of pottery-producing and -using societies demonstrate that the form of pottery is directly related to vessel function (Henrickson and McDonald 1983), the functional properties of each of the newly identified Anglo-Saxon forms were then considered. Ethnographic studies of societies who produce and consume fermented beverages using ceramic vessels were then employed as a source of analogy for Anglo-Saxon forms (see Chapter 3). By drawing on these analogies and considering the functional properties of each of the Anglo-Saxon forms, it was possible to suggest the roles that each form-type might have played in the production and consumption of fermented produce. Indeed, putative drinking, serving, storage and fermenting vessels were all identified.

Despite the fact that the same form-types were identified at both Cleatham and Elsham, there was a suggestion that some were more common at one cemetery than they were at the other. For example, two vessel-types, 1Bi and 1Di, both have restricted necks that suggest the storage of liquid, and both have similar average volumes and rim diameters (Chapter 3). Although 1Bi urns are slightly squatter than 1Di, the similarities between these two vessel types suggest that they might be considered as functional equivalents. Yet, vessels belonging to form group 1Bi are more common at Cleatham, whilst those belonging to 1Di are relatively rare. The reverse is true at Elsham, with 1Di being common, but 1Bi rare. This is an interesting observation that might provide insight into the ways that potters were producing vessels, their learning patterns and the development of local traditions. However, as only those vessels with complete profiles were considered in this analysis, further investigation is needed before any firm conclusions are drawn from this observation. Indeed, if the forms of all urns were classified (i.e. those that do not have complete profiles, but are in a sufficient state of preservation to have their form-types identified), then the frequencies might change. A recommendation for future research, then, is that all urns for which there is a sufficient state of preservation to allow their form-types to be identified should be classified according to this typology (Figure 6.1). This should be relatively simple task and would allow for a fuller understanding of the frequencies of occurrence of each form type.

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Figure 6.1: In many cases the classification of the form of urns with incomplete profiles is a relatively simple task. Despite the fact that large proportions of urns 104, 189, and 558, it is easy to see their original forms. We are unable, however, to classify the forms of severely damaged vessels.

Urn Decoration

After considering vessel form, this thesis moved to examine urn decoration (Chapter 4). This characteristic of cremation urns has almost always been viewed as a means by which to communicate details about the ethnicity, age, gender, and status of the individuals whose remains they contain (Myres 1969; Richards 1987). However, in light of the fact that these vessels have biographies that extend beyond their use as urns, it was suggested that we should begin to consider urn decoration as the product of communities who produced, used and viewed urns in domestic contexts. By drawing on ethnographic studies that specifically focus on the ways that potters decorate their vessels, it was argued that decorative styles are the result of learning networks, social relationships, apprenticeships and the environments in which potters practice their craft and the vessels are subsequently used. These factors result in potters developing a set of learned dispositions which dictate the way that decoration is applied, the types of motifs that they can use, and how these motifs are structured around the vessels. Whilst their styles are in keeping with the broader, perhaps, regional and national traditions, these localised factors result in the development of local styles and preferences.

The ethnographic observations that localised variants develop out of broader regional and national decorative styles echo Richards's (1987) findings concerning urn decoration. He identified that the potters operating at cemeteries across early Anglo-Saxon England were decorating their vessels with the same motifs and according to widely recognised and accepted norms, but that there were localised differences in the ways that decorative elements were used and the frequencies in which they occurred. For example, he determined that at most cemeteries c.40% of urns are stamped (Elsham 41%; Newark 41.5%; Spong Hill 39.1%; Loveden Hill 41%), yet, at Mucking only 11.7% of pots were stamped, 26% at Caistor, but 60% at Illington. Although there are similar proportions of stamped urns at Elsham and Spong Hill there are, on average, more stamp impressions per urn at Spong Hill than Elsham (Richards 1987, 100-4).

As Richards' (1987) study examined pottery from across Anglo-Saxon England, there were often tens or hundreds of kilometres between each of his study cemeteries. As the present study focused on two cemeteries that are c. 15km from one-another, it was possible to investigate whether localised preferences in decoration were observable over smaller distances. By classifying the decoration of urns from Elsham according to the classifications developed by Leahy (2007a) in his analysis of urns from Cleatham, it was possible to compare the occurrence of each of the decorative groups at the two cemeteries. This revealed that whilst the same types of decoration were found at both cemeteries, there were clear differences in the way that decorative motifs were used and the frequencies with which they occurred. For example, Leahy's decorative Group 02s (urns decorated with stamps and horizontal incised lines around their necks) accounted for 6.9% of Cleatham's decorated urns, but in contrast they accounted for just 3.6% at Elsham. Chevrons and stamp-decorated urns – Leahy's Group 10s – were very common at Elsham, accounting for 20.7% of the cemetery's decorated urns, but just 9.2% of decorated urns at Cleatham.

Having grouped Elsham's urns according to Leahy's decorative classification, it was possible to plot the geospatial distributions of decorative types across the cemeteries. Some of these types were relatively evenly distributed across both sites, however some appeared to be concentrated in specific areas of the cemeteries. For example, at Cleatham the majority of the urns decorated with standing arches were found along the northern and eastern edge of the cemetery, whilst those decorated with hanging arches were focused along the southern edge of the cemetery. At Elsham, hanging arch urns were seen to concentrate on the eastern side of the cemetery, whilst standing arch urns held a more westerly focus. Coupled with an analysis of stamps and consideration of how decoration was structured around cremation urns, it was possible to show that the potters whose urns were buried in close proximity to one-another where probably aware of one another's work (see Chapter 4). This analysis of decoration, therefore, suggests that the dead were being buried in community and potentially family plots.

Finally, in this discussion of decoration, we must consider how decorative styles might be used to understand chronology. Myres (1969; 1977) saw urn decoration as the primary means of dating, but – as considered in Chapters 1 and 4 – there are serious questions over the validity of his chronological conclusions. Leahy (2007a) was fully aware of the criticisms that had been levelled at Myres's system of dating, and, as a consequence, in his study of the urns from Cleatham, he explored stratigraphical relationships in urn burial and related these to the different types of decoration (see Chapter 1). In doing so he produced a five-phase chronology that allowed him to 'date' each of the Cleatham urns. As the excavators of the Elsham cemetery recorded the stratigraphic relationships that existed between each of the Elsham urns, it was possible to test whether Leahy's phasing was applicable beyond the bounds of Cleatham (Chapter 4). If it was, his phasing would provide an extremely powerful tool in understanding the chronology of early Anglo-Saxon pottery. It was revealed, however, that only 60% of the stratigraphic relationships agreed with Leahy's phasing and therefore his phasing is not applicable beyond Cleatham. This is not surprising; indeed, we have seen that localised traditions in decoration developed in early Anglo-Saxon England, and we therefore cannot expect every community to follow the same developmental trajectory at the same point in time. Moreover, as these urns were domestic, there is no way of telling how long these vessels were circulating in the domestic sphere before they were buried.

Fabrics

The clearest differences between the ways that pottery was made by the communities living in North Lincolnshire are found in the preparation of clay pastes. Indeed, by classifying the fabric of pottery from settlements and cemeteries according to a standardised fabric type-series, considerable insight was gained in to the way that pottery was manufactured by the different communities. There were clear differences in the types of temper used by the potters operating on the eastern and western banks of the River Ancholme. As potters were using locally available raw materials to manufacture their pots, local geological conditions explain many of these differences. They cannot explain them all, however, and it is likely that temper choices were also culturally influenced. For example, dung-tempered fabrics (ECHAF) were extremely common at Cleatham, yet all but absent from Elsham (Table 5.1). Similarly, the majority of non-funerary sites that surrounded Cleatham made extensive use of ECHAF fabrics, whilst those around Elsham did not. Dung would have been available to all potters on both sides of the River Ancholme and therefore raw material availability simply cannot explain this disparity (Figure 5.1).

We might consider the differences in the types of temper used by potters operating in either side of the River Ancholme as ‘regional’. Allied to these ‘regional’ differences are more localised differences, often between settlement sites that were just a few kilometres from one another. For example, whilst ECHAF fabrics are comparatively common at Cleatham (accounting for 6% of the assemblage by vessel count) and many of the non-funerary sites that surrounded it, there are a small number of sites around Cleatham where dung-tempered (ECHAF) fabrics are rare. For example, at Manton Warren, Manton, ECHAF fabrics accounted for 8% of the assemblage by vessel count, but 3km away at Mell’s Farm, Messingham, ECHAF fabrics accounted for just 0.16% of the assemblage. Both sites are within 5km of Cleatham.

Plotting the distribution of fabric-types within the cemeteries of Elsham and Cleatham revealed that certain fabrics occurred more frequently in some areas of the cemeteries than others. When these distributions are examined in light of the distribution patterns of fabric-types in the north of the county more broadly, it becomes clear that the dead were being buried in community areas of the cemetery. For example, ESMG fabrics (Early Anglo-Saxon Mixed 'Greensand' Fabrics) were not a common type at Cleatham, or indeed in the non-funerary finds sites that surrounded it, yet a distribution plot of ESMG's fabrics throughout Cleatham reveals that over half of the urns made from this type of fabric are found within a small area c. 12x16m on the western side of the cemetery. Clearly, this cluster represents the work of a group of potters who were exploiting the same raw material source(s) and then re-using their vessels as urns and burying them in close proximity to one another.

Since the distribution plots of decoration and fabric types suggest that the dead were being buried in community or family areas, then one might expect that we can correlate certain types of decoration with specific fabrics. Whilst there are suggestions that this is the case (for example see Figure 4.42 which shows that the standing arch urns are concentrated along the north-eastern edge of the Cleatham cemetery; this is exactly the place where ECHAF fabrics are most common), the situation is complicated by the fact that potters rarely chose to produce all their pottery vessels in a single fabric-type. This can be demonstrated by consideration of, for example, the work of the so-called Cleatham Daisy-Grid Potter, whose work was identified by Leahy on the basis of the decoration of a number of vessels with daisy- and grid-shaped stamps and incised pendant "kippers" (Leahy 2007a, 114) (Figure 4.87). A plot of the location of Daisy-Grid vessels within the cemetery of Cleatham (Figure 4.88) revealed that all but one of the thirteen urns attributed to this group are found in an area c. 19x19m in the eastern half of the cemetery. Examination of their ceramic fabrics at x20 magnification undertaken as part of the present study demonstrated that pots attributed to this group were, in the main, made from just two fabric types − one tempered with grass/dung (ECHAF), the other with sandstone (SST) (Table 6.1). Six Cleatham Daisy-Grid vessels were selected for thin section analysis – four ECHAF and two SST. The thin sections confirmed the tempering material identifications made at x20 magnification, but they also demonstrated that different clay sources were exploited, even when the temper was the same. For example, urns 429, 431, 1018 and 1074 were all tempered with dung (ECHAF). The clay paste of urns 431 and 1074 was prepared by adding dung to very silty clay (Figure 6.2), while, in contrast, urn 1018 was made by adding dung to a very fine, near inclusionless, probably Jurassic clay. The same near inclusionless clay was used in the manufacture of urn 429, but in this instance the potter added iron-pellets to the clay as well as dung. Thus, of the four Daisy-Grid vessels made in ECHAF fabrics that were examined in thin section, three separate paste recipes were observed; this probably represents three different production episodes.

Urn Number	Fabric	Thin Section Number	Petrographic Group (See Appendix D.2)
134	SST		
330	ECHAF		
387	FE		
429	ECHAF	MT125	Organics (Sub Fabric B)
431	ECHAF	MT128	Organics (Sub Fabric A)
498	SST	MT132	Cleatham Calcareous Sandstone Group (Sub Fabric A)
519	SST	MT150	Medium Sandstone Group (Sub-Fabric B)
883	ECHAF		
1018	ECHAF	MT126	Organics (Main Group)
1058	ECHAF		
1070	SST		
1074	ECHAF	MT195	Organics (Sub-Fabric A)
1110	SST		

Table 6.1: The ceramic fabrics and petrographic groups of urns attributed the Daisy-Grid Potter.

The use of different clays and tempers in the manufacture of pottery is not a phenomenon restricted to the so-called Daisy-Grid Potter; indeed, we see this practice occurring throughout the groups of pottery that were attributed to individuals. For example, in Chapter 5 we considered a number of Vessel Groups that were probably made by individual potters; rarely were whole groups made from a single fabric type. Similarly, Leahy identified eight Cleatham urns as being decorated in the style of the Sancton/Elkington potter. Based on nuances such as the number of lines around the neck, the overall design structure and the types of motifs used (see Chapter 4) we can organise these urns into three groups, probably representing the work of three different potters. The first group comprises urns 235, 719 and 900, the second 544 and 738, and the third 398, 647 and 1069; in not one of these groups were all the urns made of the same fabric (Table 6.2 and Figures 6.3 and 6.4). The fabric of the urns in this second group (urns 544 and 738) was examined in thin section. This analysis confirmed that sandstone was used to temper the clay of urn 738 (belonging to the Medium Sandstone Petrographic Group – see Appendix D.2) but that iron-pellets were added to the clay of urn 544 (belonging to the Cleatham Ironstone Petrographic Group – see Appendix D.2). It also demonstrated that the clays to which these two types of temper were added were different (Figure 6.3). Thus, in these two urns, seemingly produced by the same potter to judge from the form of decoration, we have two sources of clay and two sources of temper.

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Figure 6.2: Photomicrographs of thin sections of the pottery fabrics of urns produced by the so-called 'Daisy-Grid Potter'. Note that silty clays were used in the preparation of urns 431, 498, 519 and 1074, but near inclusionless clays were used in the manufacture of urns 429 and 1018. Sandstone was added as temper to the clay of urns 431, 498 and 519, whilst dung was used to temper the clays used to make urns 429 and 1018. This demonstrates that a single potter chose to exploit a range of clay and temper sources. (Images taken in cross-polarised light, image width 3.5mm.)

Urn Number	Fabric	Thin Section Number	Petrographic Group (See Appendix D.2)
235	CHARN	MT052	Cleatham Granitic Group
398	SST		
544	FE	MT098	Cleatham Ironstone Group
647	FE		
719	SST		
738	SST	MT134	Medium Sandstone Group
900	SST		
1069	ESGSNL		

Table 6.2: Characteristics of urns decorated in the style of the so-called 'Santon/Elkington Potter'.

Figure 6.3: Photomicrographs of thin sections of the pottery fabrics of urns produced by the so-called 'Sancton/Elkington Potter' (see Figure 6.4 and Table 6.2). (Images taken in cross-polarised light, image width 3.5mm.)

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Figure 6.4: Urns identified by Leahy as being decorated in the style of the so-called 'Sancton/Elkington Potter' (Leahy 2007c). Rather than being the work of an individual potter, these urns were probably made by three individuals. Potter 1: urns 235, 719 and 900; Potter 2: 544 and 738; and Potter 3: 393, 647 and 1069.

Such variability in the fabrics of urns assigned to individual potters extends beyond Cleatham into the other cemeteries of Anglo-Saxon England. For example, in their petrological study of pots attributed to the Sancton/Baston potter, Arnold and Russel (1983, 22-3) noted that the three Sancton/Baston urns from the cemetery of Millgate (Newark-on-Trent) were made from two separate fabrics. Similarly, Timby's (1993, 275) macroscopic study of the ten Sancton/Elkington pots from Sancton revealed that 'at least three fabrics were used' (Timby's Fabrics A, B and C − chalk/limestone temper, igneous rock temper, and sand/sandstone temper, respectively − equivalent to LIM, CHARN and SST). Significantly, even the Sancton/Elkington pots that were buried together in the same pit at Sancton were made from different fabrics (urns A1098b and A1098c − Fabrics B and C) (Timby 1993, 275, 326). The analysis of urns attributed to individual potters at Mucking reveals a similar pattern (Hirst and Clarke 2007, 606). These previous studies have made little of these insights, indeed Hirst and Clarke (2007, 606) offered no interpretation of the reasons for this variability in fabric-type, whilst Timby (1993, 276) simply states that the 'exploitation of more than one clay source suggests that the potters did not keep large stocks of ware but instead produced urns more or less on request'. This research, therefore, provides further evidence to suggest that individual potters in the early Anglo-Saxon period were exploiting a number of sources of raw materials. It is now possible to consider this phenomenon in light of ethnographic evidence for the first time. This provides significant insights into how pottery was produced, and raw materials sourced, in early Anglo-Saxon England.

The observation that potters rarely made use of a single fabric type to manufacture their vessels might appear incompatible with the preceding assertion that temper choices in early Anglo-Saxon England were culturally influenced. However, when we consider that pottery in this period was produced at the level of the household, for the individual household's own consumption (see Chapters 1 and 5), then we can begin to understand why and how this apparent contradiction arises. Ethnographic studies demonstrate that when pottery production takes place at the level of the individual household, it is often subordinate to other subsistence activities such as farming, fishing, hunting, or the collection of fuel (Peacock 1982, 8; Gosselain 1994, 101). Although potters operating at this level have clear concepts of the appropriate ways of making pottery and the types of raw materials that should and should not be used, they often exploit several sources of clay and temper at once. These raw material sources are often found within close proximity to places that are frequented for other subsistence activities and are accessed only when visiting these sites for subsistence purposes (Gosselain 1994, 101-6).

Support for the idea that the raw materials of pottery production in early Anglo-Saxon England, and in particularly in our study area, were obtained whilst undertaking other activities can be found by considering the types of materials used and the locations from which they might have been obtained. Mark Brisbane (1981, 235-6), for example, has argued that the use of dung as a tempering material might be related to agricultural activities, the temper deriving from the by-products of animal husbandry. Agricultural waste is not the only by-product that was used by Anglo-Saxon potters. Indeed, although it is rare, metalworking-slag is known to have been used as temper (see Chapter 5) and one might also argue that potters tempering their clay with grog were utilising the by-products of domestic activities – the grog being derived from pots accidentally broken in the home (see Russel 1984).

There are also a range of geological tempers that were potentially obtained whilst undertaking subsistence actives. For example, iron-pellet tempered (FE) pottery was common at Cleatham and it was suggested in Chapter 5 that the iron-pan forming Northampton Sand, which outcrops at Manton [SE 9347 0270] (Gaunt *et al.* 1992, 44-5), probably provided the source of these iron-pellets (see Chapter 5). It is possible that, as this iron-pan forming geology often outcrops above springs (Gaunt *et al.* 1992, 44-5), potters were obtaining their temper when collecting water. A similar suggestion can be made with regard to the exploitation of the Spilsby Sandstone, which is the source of the temper found in the EMSG and NELESGS fabrics that were extremely common at Elsham and its surrounding settlements (see Chapter 5). Indeed, this sandstone, which crops out at various points along the Wolds' edge, produces 'copious springs' (Gaunt *et al.* 1992, 69).

In Chapter 5 it was demonstrated that the raw materials used to make the urns found in the cemeteries of Cleatham and Elsham, and the pottery from the settlement sites that surround them, were obtained from geological deposits within just a few kilometres of the respective find sites. With the lack of standardisation in fabrics and the realisation that the raw materials of potting were locally obtained, probably whilst undertaking subsistence activities, we really do begin to see that pottery production in early Anglo-Saxon North Lincolnshire was on an *ad hoc* basis and at the level of the individual household.

Family Plots and Catchment Areas

A number of authors have argued that burial in inhumation cemeteries was taking place in either family or household groups (for example Parfitt and Anderson 2012, 370-8; Stoodley 1999, Chapter 8) and that the distribution of stamp groups in cremation cemeteries is indicative of a similar practice (for example Hills 1980; Ravn 2003). A broader analysis of decoration in this study, alongside the examination of ceramic fabrics, adds weight to this argument, and further support can be found by considering the evidence for grave markers within cremation cemeteries. Indeed, a number of authors have drawn attention to potential grave-markers within cremation cemeteries that would allow families, households or communities, to identify the locations of previous burials and thus maintain such plots. Indeed, Lethbridge reported that at Lackford (Suffolk) 'burials were in many cases covered by a layer or heap of flint nodules or Roman tiles, which were doubtless taken from the ruined Roman buildings for this purpose. It seems reasonable to suppose that these heaps of stones were intended as visible memorials on the surface of the ground' (Lethbridge 1951, 3). Flint nodules were also found to be 'packed around, above and below' the urns at South Elkington (Webster and Myres 1952, 26), whilst at Cleatham, 53 urns were associated with stones and dressed Roman masonry which 'might represent the remains of cairns marking particular locations' (Leahy 2007a, 29) (Figure 6.5). As stones also appear to have been used as grave-markers at Loveden Hill (Fennel 1964, 103), and large flint nodules were placed over a number of urns at Spong Hill (for example urns 2696 and 2697; Hills *et al*. 1987, Figure 123) it would appear that there was a remarkable level of consistency in the types of materials used to make these potential marks at different cemetery sites. To these putative 'cairns' we can add the evidence for wooden markers, highlighted by Williams (2000, 224). Indeed, definite post-holes were associated with urn burials at the mixed-rite cemetery of Baston (Lincolnshire) (Mayes and Dean 1976, Plate IV B and Figure 4) (Figure 6.5) and Williams (2000, 224) suggests that the aforementioned stone-piles might have acted as packing for wooden post-structures. Although it is the minority of urns that are associated with possible grave-markers, there is a possibility that many more possessed markers. Indeed, as the postholes that would have held these post-structures are often shallower than the urns themselves, many markers might have been ploughed away leaving no trace at all (Williams 2000, 230).

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Figure 6.5: Possible grave marker: a putative cairn covering urns at Cleatham (top) (Leahy 2007a, Plate 21) and post-hole grave markers in the urn pits of burials from Fonaby (bottom) (Mayes and Dean 1976, Figure 4 and plate IV B).

It was demonstrated in Chapter 1 that each of the large cremation cemeteries in North Lincolnshire lay at the heart of discrete clusters of non-funerary find sites. This suggested that each cemetery possessed its own territory and catchment area. The locations of these cemeteries in respect to the settlement sites indicated that the catchment areas extended to a c. 5km radius around each cemetery. By comparing, in thin section, this pottery produced at the household level from the settlement sites, with pottery from the cemeteries, it was possible to identify some of the settlements that were supplying urns to the cemeteries (Chapter 5). The vast majority of settlement samples that were identified as being identical to cemetery samples came from sites that were inside of the respective cemetery's c. 5km catchment areas. In conjunction, then, the ceramic and cartographical evidence provide a fuller understanding of the catchment areas that these cemeteries served.

Only c.4% of the samples taken from Elsham and Cleatham are likely to derive from sites outside of these catchment areas. Many of the 'non-local' samples found at Elsham are likely to have been produced at sites in the catchment area of Cleatham, and conversely samples from Cleatham were produced at sites within the catchment area of Elsham. In addition one sample from Elsham probably derives from a site on the Yorkshire Wolds (see Chapter 5), whilst others appear to have been produced in southern and central Lincolnshire and transported north to Elsham and Cleatham. Similar patterns are observable at the settlement sites. For example, samples from Scotton and Manton Warren are identical to a sample from Melton Ross, and thus it is likely that they were manufactured at the latter site and then transported across the River Ancholme to Scotton and Manton Warren (see Chapter 5). As is the case among the cemetery material, however, these 'non-local' vessels only account for c. 4% of the sampled settlement pottery. Yet, although small, the proportions of urns that derive from outside of the catchment areas of these cemeteries are of considerable interest to us. Indeed, whilst they may simply be the result of, for example, families moving home and taking their pottery with them, or of single individuals moving as a result of marriage, gift exchange between communities might also be a reason for the occurrence of these vessels. It is unlikely that we will ever fully understand the reasons behind why a small number of pots appear to have moved over long distances, but gift exchange is possibility that requires further investigation, as it has significant implications for our understanding of the economy and social relationships of early Anglo-Saxon England. As we shall see in the following discussion, feasting and drinking activities appear to have been major concerns in Anglo-Saxon social and political life (see also Lee 2007)[2], and, as such, it is quite possible that there was some level of exchange of vessels associated with feasting and drinking, probably, however, for their contents rather than the vessels themselves.

[2] It should be noted, however, that despite the title of Christina Lee's book *Food and Drink in Anglo-Saxon Burial Rituals* almost no consideration is given to the role of drinking. Indeed, just three pages (Lee 2007, 135-7) are given over to drinking.

Beyond Cremation: Drinking Vessels in Context

Perhaps we should not be surprised to learn that vessels associated with the production and consumption of fermented drinks were used as containers to hold the cremated remains of the early Anglo-Saxon dead. Indeed, the association between death and drinking in this period is a strong one and, as we shall see below, there are numerous examples throughout the archaeological record that demonstrate this. It is worth considering the various types of non-ceramic drinking vessels found in Anglo-Saxon cremation *and* inhumation graves, as they provide insights into the reasons why ceramic drinking vessels might have been used to contain cremated remains.

In the first instance we have the rare, but not unknown, finds of stave-built, bronze-bound, wooden vessels such as ‘buckets’ and ‘stoups’ (buckets have handles, stoups do not). Being in the region of c.10 x 10cm in height and width, and with a typical capacity of c. 0.7 litres (although some are larger), these vessels appear too small to have functioned as a means by which to fetch water to the home. As such, a number of authors have argued that they were involved in feasting and drinking activities and their relative scarcity has resulted in them being interpreted as indicative of status (Arnold 1988, 116-18; Cook 2009, 556; Ravn 2003; Stoodly 1999, 33).

To the stave-built wooden drinking vessels we can add those made from glass. The range of glass vessels is vast, including so-called claw-beakers, cone-beakers, palm cups, bowls, horns and squat jars, to name but a few (see Harden 1978). Like wooden buckets these rarely-discovered drinking vessels are found in both cremation and inhumation graves, and these too are thought to be indicative of status (for example, at Spong Hill and Mucking: Hills *et al.*1984; Hirst and Clarke 2009; McKinley 1994; Ravn 2003, 134). The elaborate forms of some of the glass vessels has resulted in them being considered as holding further social or economic symbolism. For example, as cone-beakers (essentially up-turned cones) are unable to stand on their own, it has been suggested that a level of ceremony may have been involved in drinking from these vessels (Arnold 1988, 116-19).

Chris Arnold has highlighted the fact that many of the most elaborate glass vessels, such as claw-beakers, do not find parallels in other materials such as pottery (Arnold 1988, 118). However, this is not the case for all glass vessels, indeed, some do copy drinking vessels made from other materials; for example, a pair of glass drinking ‘horns’ were found in a fifth- to sixth- century grave at Rainham (Essex) and a late fifth-or early sixth-century glass bucket-shaped vessel was recovered from Westgarth Gardens (Bury St Edmunds, Suffolk) (Harden 1978, Figures 1 and 2; Pollington 2010, 151). Some glass bowls appear to draw influence from their ceramic cousins and indeed the similarity between the form of a glass bowl from Islip (Northamptonshire) (Figure 6.6), for example, with the form to pottery urn 0004 from Cleatham (belonging to form group 3Biii – see Chapter 3) is striking. Not only does the form of this vessel draw parallels with the form of early Anglo-Saxon pottery, but there are also similarities in its decoration; the trail of glass around the neck forms horizontal bands and the trail on the lower body appears to form standing arches, which is frequently found, as we have seen, on ceramic urns. Comparable decoration is seen on a pair of glass vessels (Figure 6.6) recently discovered in the inhumation grave of the so-called 'Prittlewell Prince', a high-status early seventh-century male inhumation from Prittlewell in Essex. The similarity in decorative style of these Prittlewell vessels with that seen on ceramics becomes even more convincing when one realises that these vessels were probably manufactured in England, possibly in Kent (MoLAS 2004, 430-6).

Figure 6.6: Glass and pottery vessels. Glass bowl from Islip (top left) (Northamptonshire) (Harden 1978, Figure 1). Pottery urn from Cleatham (top right) (Leahy 2007c). Glass vessels from Prittlewell (Essex) (Museum of London n.d).

Whilst glass and stave-built drinking vessels may have been attainable only by the higher echelons of society, we might consider that less elaborate vessels such as turned wooden bowls might have been available to most of the populous. In truth, however, as wooden vessels rarely survive, we can only guess at the extent to which wooden bowls and cups might have been used in life and subsequently deposited in cremation and inhumation graves. Indeed, their presence in inhumation and cremation graves is only attested by metal clips and strips that were used to repair them (Hills *et al.* 1984, 7; McKinley 1994, 89).

To this list of drinking-related paraphernalia found in Anglo-Saxon graves, we can also add a range of imported wheel-thrown ceramic vessels mainly found in inhumation graves in Kent (Evison 1979). The quality of manufacture of these continental imports is in sharp contrast to the low-fired, coil-built pottery produced in fifth- to sixth- century England. Whilst a small number of these continental forms are similar to those produced in England, for example, jars and bowls, the most common are those that were not, such as bottles, jugs, and pitchers. It is significant that these forms, like those of glass and stave-built wooden construction, are associated with drinking. In her 1979 corpus of *Wheel-Thrown Pottery in Anglo-Saxon Graves*, Vera Evison suggested that, as many of these vessels appear to originate from France and Belgium, they may have been related in some way to a trade in wine. She saw this as being indicative of status and perhaps connected to the adoption of Christianity (Evison 1979, 43-65).[3] If, indeed, the persons buried with these vessels were Christians, we might consider that at least some of them were recent converts and that the provision of a drinking vessel might represent the continuation of a pagan tradition (Evison 1979, 43-65). Such an interpretation accords with the pagan and Christian elements present in the funerary assemblage of the 'Prittlewell Prince'.   Despite being buried with two gold-foil crosses, this 'prince' was also equipped with a plethora of grave-goods which might pertain to pagan ideologies or cultural practices (MoLAS 2004, 430-6).

It is worth noting that wheel thrown imported vessels are not the only type of pottery found in inhumation graves of the early Anglo-Saxon period. Indeed, it is often the case that inhumed persons are accompanied by so-called pottery 'accessory vessels'. It is significant that these handmade vessels follow the same range of forms, are made of the same types of fabric, and are decorated in exactly the same fashion as early

[3] King Æthelbert of Kent converted to Christianity in AD 597 and married a Christian Frankish princess (Evison 1979, 50).

Anglo-Saxon cremation urns (e.g. Mucking (Hirst and Clark 2009), Spong Hill (McKinley 1994), Cleatham (Leahy 2007a)). As the identical use-alteration characteristics were observed on both the inhumation accessory vessels and cremation urns from Cleatham (Figure 2.14), it is clear that these two classes of mortuary vessel served similar functions in life, and thus, they may have served similar functions in the grave.

To summarise, then, although each of the individual types of drinking vessel discussed above (excluding the ceramics accessory vessels found in inhumation graves) are relatively rare finds, cumulatively they demonstrate that drinking vessels were frequently deposited in early Anglo-Saxon inhumation and cremation graves. This clearly demonstrates that drinking held a special place in the minds of Anglo-Saxons and that they felt the need to supply their dead with drinking-related paraphernalia. When commenting on the relationship between glass and ceramic vessels, Arnold noted that 'it is difficult to find ceramic equivalents of distinctive glass forms ... there was not, for example, the poor man's version of the glass cone-beaker' (Arnold 1988, 118). Whilst this is true, and these distinctive vessels may have held some social and economic symbolism that was conveyed by both their form and material, the absence of the 'poor man's' cone-beaker does not preclude the possibility that an 'ordinary' Anglo-Saxon man or woman had access to alcoholic beverages or held drinking in the same regard as those that had access to the higher-status, socially charged vessels. Support for the suggestion that the lower-status might have had access to alcoholic beverages is found in the later written sources. In the late seventh-century *Penitential of Theodore,* for example, Theodore states that 'laymen' who are 'drunk against the Lord's command ... shall do penance for twenty days ... without beer' (*Penitential of Theodore*, Book I, I, vi; McNeill and Gamer 1990, 184). In the late tenth/early eleventh century, we learn from the boy in *Ælfric's Colloquy* that ale is the drink of the less wealthy:

> *Teacher*: What did you have to drink?
>
> *Boy*: I drink ale, usually, if I drink at all, and water if I have no ale.
>
> *Teacher*: Don't you drink wine?
>
> *Boy*: No, I am not rich enough to be able to buy myself wine: Wine is not a drink for boys or fools but for old men and wise men (Watkins 2006, 13).

Since cremation urns and inhumation accessory vessels appear to have been involved in the production and consumption of fermented drinks prior to their burial, it can be suggested that these frequently occurring decorated ceramic vessels were, in fact, the production and consumption vessels of the majority of the populous. With this in mind we must now consider why such vessels were seen to be appropriate containers to hold the remains of the cremated dead.

Why Use a Fermentation Vessel?

In the first instance we can see that the deceased's friends and relatives made a conscious choice in the selection of an appropriate vessel. That decorated vessels were favoured over their plain counterparts is demonstrated by the fact that at most cremation cemeteries decorated urns outnumber plain urns by roughly three or four to one. In addition to the decision of whether to bury the dead in a decorated or plain urn, a choice also had to be made with respect to the shape and size of the urn. That this was the case is demonstrated by the earlier work of Richards (1987, 136-9), which concluded that 'there is a close correlation' between the size of the vessel and the age of its inhabitant; infants were most frequently found in the shortest urns, whilst adults more commonly found in the tallest vessels. He also identified that women were more commonly buried in vessels with above average rim diameters. Clearly, then, cremation urns *were* intentionally selected, but not – as Richards believed – at the point of manufacture, rather, at the point of selection from among the range of available domestic vessels.

At the most prosaic level, one might argue that a decorated vessel was selected for use as an urn simply because it was decorated and was therefore aesthetically pleasing. Certainly, decorated urns do appear to have a better quality of manufacture than the majority of undecorated urns, a point which has been raised by a number of authors (for example Mainman 2009, 610; Myres 1969, 12-3). The choice to use a particular size of vessel could have been made in similarly mundane way; infants might be found in smaller pots simply because they are smaller than adults and therefore required a smaller container to hold their cremains. Yet, we must question, if the reason was simply because a pot looked 'nice', or was well made, then why use a pot at all; why not use a container made of some other material which would also provide the aesthetic requirement? It is argued here that it was not the decoration that was the reason for selecting a domestic pot for use as an urn; rather it was its pre-burial function that made it an appropriate container to house the remains of the dead.

That it was pre-burial function, rather than urn decoration, that deemed specific vessels to be appropriate for use as cremation urns is demonstrated by the results of use-alteration analysis presented in Chapter 2. Here it was revealed in that 24% of Elsham's complete decorated urns were internally pitted, indicating that they had been involved in fermentational processes prior to their burial; 13% of the complete undecorated urns also suffered from this type of attrition. The pattern was replicated in the larger Cleatham assemblage, with 33% of decorated and 13% of the undecorated complete urns being internally pitted. It would appear, then, that at least some of these undecorated urns had fulfilled a similar, if not the same, function to their decorated counterparts. Thus, we can argue that individual vessels were selected for use as urns not simply because they were aesthetically pleasing, but because of the role that they had fulfilled prior to their burial. There is no simple answer as to why vessels associated with the production and consumption of fermented produce were thought appropriate, but we can consider a number of potential reasons why this might have been so. The following section takes a rather heuristic approach, exploring a number of possibilities.

Feasts, Oaths and Allegiances

Mads Ravn (2003, 134) has called attention to the remains of drinking related paraphernalia such as glass cups and small wooden buckets in the cremation graves at Spong Hill (but also in Denmark and south-eastern Europe).[4] Such artefacts, he reports, are related to a group of males whose grave assemblages also include cremated horse bones, shears and gaming pieces. He interprets this group as being the 'most prestigious ... among the cremation graves' and argues that the horse's presence in this assemblage is a symbol of a 'divine relationship between their [the group of males] power and the God Odin'. The drinking vessels that form part of the assemblage of this group, he suggests, are symbolic of the drinking that formed part of the 'initiation rite of retainers and in the social life between warlord and warrior' (Ravn 2003, 134).

Christina Lee (2007) has likewise discussed the role that drinking played in the forming and maintenance of bonds in Anglo-Saxon England and particularly those

[4] Many of these artefacts were placed on the pyre and are represented only by molten and burnt remains (see McKinley 1994, 91).

between lords and retainers. Highlighting the following passages from Heroic Poetry – the first from *Boewulf* and the second from the *Finnsburh Fragment* – she sees drink as a reminder of a retainer's obligation to repay their lord's hospitality: 'I remember the time when, as we drank mead there in the beer-hall, we would promise our lord, who gave us these treasures, that we would repay him for these battle accoutrements...'; and 'Never have I heard ... of youth better repaying shining mead than his young warriors repaid Hnæf'(Bradley 1982, 480, 509, lines 2633-6 and 35-8; Lee 2007, 132-3). The symbolic role that drinking played in oath taking and the affirmation and maintenance of bonds is not restricted to these two examples and is in fact demonstrated throughout *Beowulf* ; for example, 'men-at-arms grown heady with beer have pledged over the ale cup' (Bradley 1982, 424, lines 480-1) and 'the thanes are obedient ... having drunk to it, will do as I bid' (Bradley 1982, 444, lines 1229-31).

The role that drinking held in Anglo-Saxon England, therefore, draws parallels with the role that it seems to have fulfilled in pre-Christian Scandinavia. Alexandra Sanmark (2004, Chapter 5; 2010), for example, reports that in Scandinavia subjects often invited their chieftains to their feasts, in the hope that they would be rewarded with the chieftain's support and protection. In particular, she highlights a clause in the late eleventh-/early twelfth-century *Law of the Gulathing* in which a king was expected to show gratitude to the host of a feast by repaying them with a gift of land. The name given to this gift is the *drekkulauni*, the origin of which can be found in the words drink (*drekka*) and reward (*launa*) (Sanmark 2004, 210). Whilst these practices are preserved in the records of the Christian Church, Sanmark (2004, 209-10) argues that such drinking and feasting activities have their origins in pre-Christian society, being the cornerstone of social and political life and the place where bonds and allegiances between various parties were formed.

Although Sanmark's (2004; 2010) examples are drawn from Scandinavia and are later than our period of study, she argues that feasting and drinking were taking place throughout pre-Christian Anglo-Saxon England and that these activities probably fulfilled similar roles to those that they had in Scandinavia. That feasting was taking place in early Anglo-Saxon England is suggested by a letter from Pope Gregory I to the missionary, and first bishop of London, Mallitus (dated AD 601), in which Gregory urges the missionary not to prevent the Anglo-Saxons from carrying out sacrificial feasts, but attempt to transform the contexts in which the feasts take place to Christian occasions: 'and no more offer animals to the Devil, but kill cattle and glorify God in their feast, and return thanks to the Giver of all things for their abundance' (Bede's *Ecclesiastical History* I.30; Sellar 2012). Further evidence for feasting is provided in the seventh-century *Penitential of Theodore,* in which Theodore bans the newly baptised from eating with pagans. Sanmark suggests that Theodore was attempting to break up the non-Christian feasting groups and thereby assist in the formation of new groups, the members of which, it was hoped, would transfer allegiances to the Church and feast together to celebrate Christ (Sanmark 2004, 209-11).

We might suggest, then, that as drinking and feasting appear to have held some unifying quality, the selection of a pottery vessel that had been involved in the production and consumption of fermented drinks for use as an urn may indicate that the vessel was seen as symbolic of bonds formed in life. Indeed, if these vessels had been used in large scale feasting activities, or more prosaically, in the provision of hospitality to family and friends in a domestic environment, then there is every possibility that, prior to their death, the dead and the living had shared a drink from the vessel (or at least the liquid that had been fermented in it) before its use as an urn. By using such vessels, the bonds formed in life may have been symbolically carried into the grave to be maintained beyond death. Howard Williams argues that a similar connection between the living and the dead is manifest in the cremation rite through the use bone combs, a relatively frequent find in cremation urns. These combs are rarely found complete, having been snapped prior to deposition. Williams argues that a portion of the comb was given to the dead, by placing it in the urn, and the remainder was retained by the living. This sharing of a physical object, therefore, produces a tangible link between the living and the dead (Williams 2010, 74).

Although it was reported in Chapter 2 that it is unlikely that the attrition on cremation urns − which is indicative of fermentation − developed as a result of funerary feasting alone, this does not preclude the existence of funeral feasting in the early Anglo-Saxon period. Indeed, it has been suggested that the presence of cremated animal and plant remains within cremation urns might be indicative of such feasting (Williams 2010, 72-3). In addition to cremated foodstuffs, Tim Pestell (2001, 260) has identified a number of possible cooking pits in early Anglo-Saxon cemeteries, which he considers might also represent the ephemeral remains of funeral feasts. Sanmark (2010, 171) allies Pestell's observation with later written evidence for pagan funeral feasting; in particular she draws attention to *Ælfric's Pastoral Letter for Wulfsige III, Bishop of Sherborne* (dated to c.AD 993-995), in which priests are urged not to 'attend the corpse unless you have been invited to it. When you are invited to it, you are to forbid the heathen songs of the laymen and their loud laughter. Nor are you yourselves to eat or drink in the place where the corpse lies, lest you are imitators of the heathenism which they practice' (Whitelock *et al.* 1981, 218). The evidence for funeral feasting in Anglo-Saxon England draws parallels with the performance of post-mortem feasting and drinking rituals, particularly the serving of so-called "inheritance ale", or "soul's ale", carried out in Scandinavia. According to Sanmark these rituals 'served to strengthen the bond between the living and the deceased ancestors' (Sanmark 2004, Chapter 5; 2010, 170). We have already discussed how the re-use of a vessel, as an urn, that had participated in feasting activities in life might have served to maintain the bonds between ancestors after death, we might also consider, then, that the bonds were strengthened even further if the penultimate use of this vessel, before it was used as an urn, was to prepare and serve the living with the deceased's funeral ale.

Transformations, Journeys and the Afterlife

A further explanation as to why vessels apparently used in the preparation of fermented produce might be found in the transformative qualities that fermentation vessels may have been thought to possess. Williams (2004b) has discussed at length the transformative nature of the cremation rite and in particular he describes the way in which the process might be viewed as a means by which to convert the corpse from living relative to ancestor. One could argue that – as fermentation is itself a transformative process, changing a mixture of dry grains and water from a non-alcoholic blend into an intoxicating beverage – vessels used in the production and consumption of fermented drinks might also be viewed as holding some transformative quality. As discussed in Chapter 3, when a porous vessel such as a low-fired ceramic has been used in fermentation, bacteria and fungi are often preserved in the pours. In subsequent fermentations these bacteria and fungi act as starter-cultures, initiating the fermentation processes. Thus, without an understanding of the role that bacteria and fungi play in fermentation, to the Anglo-Saxons, these vessels might have been considered as being the keepers of some magical transformative quality, which might have assisted the dead in their metamorphism to ancestor.

To the idea of transformation, we might perhaps consider that the ancestor was being equipped for the afterlife. Whilst Anglo-Saxon scholars are, quite rightly, 'reluctant to search for a Valhalla in the data' (Williams 2010, 70), it has, nonetheless, been argued that there is evidence of an Anglo-Saxon belief in the soul and in particular a pre-Christian ancestor cult (Sanmark 2010, 162-8). Alexandra Sanmark (2010) has been particularly active in the pursuit of this soul and it is worth considering her work here. Using Norse religion as an analogy for Anglo-Saxon beliefs, Sanmark discusses the way that shape shifting, often into the form of a bird, can be seen as a representation of the soul. As avian imagery is present through the Anglo-Saxon poems *The Wanderer* and *The Seafarer*, which specifically portray the soul in flight, and in material culture such as the seventh-century Sutton Hoo helmet and purse (Figure 6.7), she argues that a similar perception of the soul might have existed in Anglo-Saxon England. In *The Seafarer*, for example, the winged nature of the soul is suggested by the following:

> my soul with the sea flood
> over the whales country soars widely –
> over the surface of the earth – then comes back again to me (lines 59-61, cited in Glosecki 1989, 78).

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Figure 6.7: Reconstruction of the Sutton Hoo helmet (Sanmark 2010, Figure 8.2). Note the bird on the front of the helmet; it is formed by the moustache, the nose, eyebrows and forehead.

Drawing on Stephen Glosecki's (1989) work on shamanism in Old English poetry, she conceives how the ancestors might 'at times provide comfort for the human soul' and that 'ancestral spirits were reached through ecstatic flight' (Sanmark 2010, 163). Her interpretations would suggest, then, that the connection between kin is not severed by death and there is some place beyond the realm of the living where the spirits of the ancestors dwell. If the Anglo-Saxons held a vision of the soul and an afterlife, it is tempting to see provisions of food and drink in both inhumation and cremation burials as 'rations for the deceased spiritual journey' (Fern 2010, 134). In such a case we might also consider that the presence of a drinking, serving, or fermenting vessel (see the discussion of the functional properties of various vessel forms in Chapter 3) in the grave as providing for this journey but also as equipping this new ancestor with a vessel that might allow them to partake in the drinking and feasting rituals of the afterlife.

With respect to this use of vessels in the afterlife it is interesting that specific groups of individuals appear to have been afforded different vessel types. As was discussed above, the cremated remains of children are more commonly found within the smallest vessels whilst adults are found in the largest (Richards 1987, 136-9). In the typology of form presented in Chapter 3 small vessels equate to the 'miniatures group', and with volumes of c. 1.5 litres these 'miniature' vessels might be associated with personal or small group consumption. Whilst one would be justified in arguing that this age/vessel-size dichotomy is a result of larger and smaller bone assemblages, such an argument cannot account for Richards's (1987, 139) findings that women occur more frequently in vessels with above average rim diameters. Such vessels belong to Groups 2 and 3 in the typology of form and it was argued in Chapter 3 that the wide rim diameters and squat bodies of vessels belonging to these form-groups offer easy access to the contents, assist in the stirring of contents and facilitate the distribution of produce by dipping and ladling. We might conclude, then, that this gendered choice of vessel may well reflect particular roles that the deceased played in life or the roles that they might be expected to fulfil in an afterlife. That is to say, for example, that women were more frequently buried in serving and preparation vessels, which, as we shall now see, might be seen as a reflection of the preparatory and distributive roles that they may have played in life, and may have been expected to fulfil in an after-life.

Gendered roles for both the living and dead are suggested both archaeologically and textually. Heinrich Härke (1997, 130-136), for example, identifies groups of grave-goods, or ‘kits’, that were deposited more frequently with males and a group that were deposited with females. The female ‘kit’ consists of brooches, beads, pins, keys, girdle-hangers and textile and weaving tools and the male ‘kit’ comprises weapons and tools (excluding those associated with weaving).[5] Whilst this association suggests that textile production was in the hands of women, it must be acknowledged that not all women buried with the tools of textile production were necessarily weavers nor were all men buried with weapons therefore warriors. Instead, these gendered assemblages, Härke reports, are likely to relate to the Anglo-Saxon perception of gendered roles and statuses within society (Härke 1997, 130-6.) The female association with weaving is complemented by the serving and distributive role that women appear to have fulfilled in the heroic poetry. In *Beowulf* the wives and daughters of high ranking men are frequently seen as distributers of gifts and drinks: Hygd, daughter of Hareth, is ‘not niggardly nor over-frugal towards the Geatish people in gifts and precious treasures’; Freawaru, Hrothgar’s daughter, ‘would bring the ale-cup before the contingent of seasoned retainers ... where she presented the precious riveted cup to the heroes’; and finally, Hrothgar’s queen, Wealhtheow ‘went around every group of seasoned and youthful retainers and offered the precious chalice until the due time arrived when the ring-bejewelled queen ... carried the mead-cup to Beowulf’ (Bradley 1982, 427-8, 462, 464, lines 612-624, 1925-30, 2018-21).

This distributive and drink-serving role played by women in the poetry is mirrored in the Anglo-Saxon laws. In the *Law of Æthelbert* (AD 560-616) fines were levied on those men who slept with a nobleman’s or a freeman’s cup-bearer (Laws 14 and 16; Attenborough 1922, 7), whilst in the later laws of Cnut women appear to be the keepers of the keys to the ‘store-room’ (Fell 1984, 59-60). Christine Fell sees the presence of so-called girdle-hangers (key-shaped objects which have no obvious functional use) in early Anglo-Saxon graves as a symbolic representation of women’s control over this ‘store-room’ and household economics (Fell 1984, 59-60). Further archaeological evidence of women’s distributive role, and particularly their association with the serving of drink, is provided by the occurrence of ‘strainers’ in women’s graves. These perforated spoon-shaped metal objects are thought to have functioned as means by which to separate solids from liquids in the serving of fermented drinks (Arnold 1988, 116; Pollington 2010, 156-9). Given this association with women and the serving of drinks in Anglo-Saxon England we might suggest that the preferential

[5] Although it is acknowledged that there are rare instances where the skeletal grouping and the grave-goods do not fit this pattern i.e. male ‘kits’ in female graves and vice versa (Härke 1997, 132).

placement of female cremains in wide mouthed, above average rim diameter vessels, suitable for the distribution and serving of drink, might reflect a social role played in life, or one that they might be expected to have fulfilled in the afterlife.

Rethinking Urn Decoration

In the preceding discussion it was suggested that cremation urns might have been perceived as holding some transformative quality that assisted the deceased's metamorphosis into ancestor. It was also suggested that these urns probably took part in feasting and drinking activities long before they were selected for use as an urn. In light of these observations we can perhaps begin to reconsider the meaning and function of some of the motifs that were used to decorate these urns. In doing this it is perhaps worth briefly revisiting the motifs that we see on cremation urns and some of the interpretations that these motifs have been afforded. Swastikas, for example, either in the form of stamps, or drawn into the surface of the clay have been associated with the Norse god Thor (Myres 1969, 137; Reynolds 1980). Swastikas are sometimes accompanied by representations of serpents or dragons and Myres interpreted this as relating to myth in which Thor fights the 'Cosmic Dragon or Serpent' (Myres 1969, 137). Quadrupeds such as stags and dogs/wolves, and horses were also represented on cremation urns (Myres 1977, Figure 365, Nos. 882 and 883; Hills *et al.* 1987, Figure 73). In particular one dog/wolf image seen on an urn from Caistor-by-Norwich (Norfolk) is thought to represent a scene from the Norse myth *Ragnarök.* Williams (2001, 199; 2005, 21-9) has suggested that these motifs might represent otherworldly guides or shamanistic familiars. He has also suggested that as stamps themselves were often made of carved animal bone and antler, the stamping of urns may have been seen as 'adorning the dead with animal elements' (Williams 2005, 24). As was discussed in Chapter 4, these types of motif are not the most common and we must consider how they relate to those that occur frequently such as chevrons and standing arches.

Chris Fern has recently considered the representation of horses in Anglo-Saxon metalwork and pottery. In particular he asserts that hanging and standing arches, and a small number of stamps, might be seen as abstracted representations of a horse's foot and footprint (Figure 6.8). As Figure 6.8 demonstrates, the examples that he provides are extremely convincing, with the decoration clearly being similar to a horse's foot and footprint. He relates these symbols to a much wider Anglo-Saxon horse-cult, traceable through metalwork, historical documents, and animal bones in burials (Fern 2010). He considers that equine iconography might relate to the Hengist and Horsa myth which has its likely origin in Schleswig-Holstein and Jutland, the historically claimed homelands of the Anglo-Saxons (Fern 2010, 146, 150-1).

If specific motifs were related to certain deities and mythology, it is interesting to consider how these motifs might have been viewed in the context in which pottery was used. We have already discussed, for example, the role that feasting and drinking might have played in early Anglo-Saxon social and political life. One might imagine, then, that vessels used in drinking that were adorned with symbols invoking deities might have served as *aide memoires* to the telling of stories at communal feats or in the home. We have also considered that these vessels might have been considered as holding transformative qualities. It is interesting that many of the zoomorphic images relate to animals in to which certain deities were able to transform themselves. For example, Sanmark (2010, 161) reports that in the Norse *Ynglinga Saga,* Odin took the form of a 'winged creature, a quadruped animal, a fish or a snake'. Thus, we might consider that deities with the power to shape-shift may have been invoked through decoration on pottery to assist in the transformation that takes place in fermentation. Whilst it is acknowledged that this interpretation is rather equivocal, the major point is that, by realising that cremation urns were not produced for the funeral but that they had pre-burial domestic functions and histories, we must return to many of the issues concerning their decoration and reconsider, as we have just done, what these symbols might have meant when viewed in a non-funerary context.

Figure 6.8: Horse imagery on pottery and metal work (Fern 2010, Figure 7.8).

Exchange

Finally, in this discussion of the reasons why the Anglo-Saxons chose to use the vessels associated with the production and consumption of fermented produce, we might consider the evidence for exchange. It was revealed in Chapter 5 that a small number of vessels found in the cemeteries of Cleatham and Elsham were obtained from sites beyond their catchment areas. There may be a number of reasons why these 'non-local' urns were found at Elsham and Cleatham. For example, they may have arrived at the cemetery as a result of persons moving home, and taking their pots with them in this move, and then being buried in their new 'local' cemetery. Alternatively, they might have arrived there as the result of someone moving away from their community but then on death their remains were returned, in an urn, to be buried in an ancestral burial ground. It might also be the result of gift exchange between different communities, perhaps at a wedding, funeral, or a feast.

A number of authors have commented on the mode and levels of exchange in the early Anglo-Saxon period. Indeed, evidence for the intensification of crop processing and livestock rearing does not emerge until the late seventh century (Moreland 2000, 97) and it has been claimed that self-sufficiency was been the focus of life for many before this date (Arnold 1988, 92-3). Little evidence exists for a developed system of exchange before the late seventh century and any exchange that was taking place is likely to have been at a local level with gift exchange being the likely basis for much of it (Arnold 1988, 92-3; Wickham 2005, 808-11). Even items imported from the continent, it has been argued, may have arrived through a system of gift exchange rather than 'more organised trade' (Huggett 1988, 93).[6] This exchanging of 'gifts' would have played an important role in the making and breaking of bonds (Arnold 1988, 93l; Huggett 1988, 93-4). It is notable, then, that the function of the vessels in this study which might have been gifted from a community living on one side of the River Ancholme to one on the other, are also apparently associated with bond-forming activities.

Whilst it is possible to identify, using petrographic analysis, those vessels that might have been gift exchanged over relatively long distances, it is not possible to identify those that were being exchanged over shorter distances. We saw in Chapter 5 that potters living at sites in close proximity to one-another (c. 5km apart) appear to

[6] There is evidence, however, from the late sixth century of the existence of merchant or freelance traders – indicated by the presence of weights and balanced in graves (Huggett 1998, 93).

have been sharing raw materials and therefore we cannot comment on the extent to which pots were moving between such sites. There is a suggestion, however, that this small distance exchange was occurring. If we accept that burial was taking place in family/community groups and then return to consider the vessels of the so-called Cleatham Daisy-Grid Potter, we see that there is a single vessel that was deposited well outside of the main Daisy-Grid cluster (Figure 4.88). This urn might represent a vessel that passed from one community to another, before being buried in the receiver's community burial area of the cemetery. Whilst this is only conjecture, it is a possibility that is worth highlighting.

Summary

This chapter has reviewed the main findings of this thesis. It has discussed the pre-burial functions of cremation urns and the roles that various different forms might have played in the production and consumption of fermented produce. A study of the fabric and decoration of funerary and domestic pottery reveals that there are considerable differences in the ways that the way that pottery was produced by the various communities that were living in early Anglo-Saxon North Lincolnshire. Ethnographic studies of pottery production teach us that the fabric, form and decoration of pottery are all produced within the bounds of culturally controlled dispositions, or *habitus* (for example, Gosselain 1992, 1994). Andrew Russel (1984), Paul Blinkhorn (1997), and Alan Vince (2008) have all made the case for pottery in early Anglo-Saxon being produced according to culturally controlled rules, with fabrics, forms and decoration all being influenced, maintained and modified according to the dispositions, learning patterns, motor-habits and *habitus* of potters. The differences that we see in the form, fabric and decoration of pottery produced by the communities using the cemeteries of Cleatham and Elsham certainly strengthen their argument.

The detailed petrographic analysis of cremation urns and pottery from domestic sites in North Lincolnshire has revealed that potters were obtaining their raw materials from local sources, often within just a few kilometres of the sites from which the pottery was discovered. Moreover, a comparison of the pottery in thin section from funerary and domestic contexts has thrown considerable light on the catchment areas that these large cremation cemeteries served. Indeed, in almost all instances where a thin section of an urn was identified as being identical to a thin section from a domestic site, the domestic site was located within a c. 5km radius of the respective cemetery. Indeed, in only c.4% of samples taken from the cemeteries were samples identified as having originated from a settlement site beyond this 5km radius.

Finally, the reasons behind choosing a drinking-related vessel for use as a cremation urn were explored. Drinking vessels are strongly associated with burial in the early Anglo-Saxon period. Many of those that we clearly recognise as drinking vessels are made of materials such as glass, wood and metal, and they have been interpreted as being indicative of status. This discussion has argued that the ceramic vessels used in cremation − and those that accompany inhumations of the same period for that matter − can now be viewed in the same light as their more elaborate counterparts. In other words, these ceramic vessels were probably the drinking and fermenting vessels of the majority of the populous, and it was important to the early Anglo-Saxons to provide their dead with such a vessel.

Finally, it has been argued that as these vessels are likely to have taken part in feasting and bond-forming activities before they were selected for use as cremation urns, these urns might be seen as a means of maintaining bonds and relationships beyond death. The small amount of pottery that appears to have travelled over a considerable distance before being buried as an urn might therefore represent gift-exchanged items that also took part in these bond-forming activities.

Chapter 7

Conclusion

This thesis has brought together a number very different, yet interrelated, aspects of early Anglo-Saxon pottery and burial studies. It has considered the pre-burial origins of cremation urns, both in terms of how they functioned before being selected for use as urns and where they originated from. In doing so, it has shed considerable light on how pottery was manufactured and its raw materials sourced, the environments in which pottery was produced and used, the extent of the territories served by large cremation cemeteries, and how burial was organised within these cemeteries. Whilst this study has focused on pottery recovered from two cremation cemeteries in North Lincolnshire – Elsham and Cleatham – and 80 non-funerary pottery find-sites that surround them, there is a considerable body of evidence which suggests that the practices identified here are likely to be found in the cemeteries and settlements throughout early Anglo-Saxon England. This chapter summarises the main findings and suggests some further avenues of research.

Functional Findings

In Chapter 1 it was revealed that for many years scholars have held the belief that cremation urns were produced specifically for the funeral (e.g. Leahy 2007b; Richards 1987; Wilson 1962). Although a small number of authors have argued against the specialist funerary production hypothesis (e.g. Hirst and Clark 2009), suggesting that urns were re-used domestic vessels, it has been shown here that neither group's evidence stands up to scrutiny. By taking a use-alteration approach to the study of early Anglo-Saxon pottery it has been demonstrated empirically that the vast majority of cremation urns fulfilled domestic functions prior to their burial and that many show signs of having been involved in the production and consumption of fermented produce such as beer. It has also been shown that the decoration of pottery was directly linked to pre-burial function (Chapter 2).

As a consequence of these findings, the forms of cremation urns were reconsidered (Chapter 3). Consultation of a range of ethnographic studies demonstrated that the features Anglo-Saxon archaeologists have focused on to classify the forms of pottery are not those that pottery-producers and -users employ in the categorisation and classification of their vessels. By identifying the characteristics that form the basis of ethno-taxonomies, and then using these to develop a new classificatory system for early Anglo-Saxon pottery forms, it was demonstrated that potters had clear concepts of acceptable types and that they manufactured them according to relatively standardised increments of size and shape. Furthermore, it was possible to suggest the roles that these vessels might have taken in the production and consumption of fermented beverages.

Potting Traditions

The observation that potters were producing forms according to accepted norms is supported by the study of decoration. Chapter 4 established that the majority of potters decorated their vessels within the bounds of an acceptable structure, and drew on a 'stock' repertoire of motifs. Despite this, cemetery-specific preferences were identified and this accords with Richards's (1987, 100-4) observations that whilst there was a high level of consistency across the cemeteries, there are differences in the frequencies with which particular types of decoration occur and the ways in which individual motifs are used. Clearly, then, although the potters of early Anglo-Saxon England decorated their vessels in an overall Anglo-Saxon style, localised traditions existed within this repertoire.

The results of hand specimen and thin section analysis of the ceramic fabrics of the urns and the pottery from the non-funerary find-sites support earlier scholars' findings (albeit from different regions of study) that in the early Anglo-Saxon period pottery was produced at household level, on an *ad hoc* basis, using raw materials obtained from within just a few kilometres of the sites from which the pottery was recovered (e.g. Russel 1984). Although the same types of raw materials were used by potters operating throughout the study area, and indeed early Anglo-Saxon England more broadly, localised preferences in fabric types were evident. As geology was unable to explain some of these differences, they must be considered to be the result of cultural choice, and as indicators that pottery was being produced according to localised traditions. Again this agrees with observations made by previous authors (e.g. Blinkhorn 1997; Russel 1984).

Communities and Catchment Areas

The existence of localised potting traditions is a theme that is repeated throughout this study. These traditions were not only observable on the macro-scale, over broad geographical areas, but also on the micro-scale, within the cemeteries themselves. This is displayed by the clustering of certain fabric- and decorative-types within different areas of the cemeteries. These clusters demonstrate that the dead were being buried in family, household or community plots and that the potters whose urns were buried within these clusters probably belonged to the same community of practice (see Bower and Patton 2008).

Particularly notable aspects of this study are the ceramic thin section relationships that were identified between the pottery from the non-funerary find-sites and the cemeteries (Chapter 5). These afford considerable insight into the extent to which pottery was moving around the early Anglo-Saxon landscape and, perhaps more significantly, they provide an empirical means by which to determine the extent of a cemetery's catchment area. Indeed, these ceramic relationships reveal that both Cleatham and Elsham served territories with c. 5km radii. The distribution of non-funerary find-sites within the study area suggests that Bagmoor possessed a similarly sized catchment area, but unfortunately, due to this cemetery's destruction, this cannot be tested through thin section analysis.

Beer and Burial

The findings of this study add to a growing body of evidence which indicates the importance of feasting, gift-giving and the consumption of alcohol in early Anglo-Saxon social, cultural and ideological structures. Alexandra Sanmark (2004; 2010), for instance, has argued that the drinking of alcohol played a pivotal role in the formation and maintenance of bonds in early Anglo-Saxon society. It is particularly striking, furthermore, that when we contextualise the cremation data in light of wider contemporary funerary practices, we see the use of other forms of drinking paraphernalia (and the raw ingredients of alcohol production) in inhumations graves. Whether this stemmed from the status of the product, its real or perceived nutritional benefits, beliefs about provisioning the afterlife, or the drink's socio-cultural role (e.g. as a form of 'gift exchange' with the dead) is presently difficult to discern. Nonetheless, since it seems to have been the case that some early Anglo-Saxon dead were interred in vessels that were integral to the brewing process, there is scope for suggesting that alcohol – and specifically beer – was a significant commodity not only for the living, but also for the dead.

New Methods in Anglo-Saxon Pottery Studies

A major success of this research has been the successful application of use-alteration analysis to Anglo-Saxon pottery. Its value is not restricted to early Anglo-Saxon pottery studies. If applied correctly, and used to answer targeted questions, this mode of analysis has the potential to completely revolutionise our understanding of past societies' pottery-using traditions. It is an extremely cost-effective method of analysis that can be undertaken whilst carrying out other, established methods of analysis (such as hand specimen fabric identification and quantification) on pottery from any time period; indeed, it has even been successfully carried out on eighteenth-century glazed wares (Griffiths 1978).

The value of petrographic analysis in the study of early Anglo-Saxon pottery has also been reiterated in this research (see also Vince 2005a). Indeed, without this method of analysis, it would have been impossible to shed any further light on the catchment areas of large cremation cemeteries, the source of raw materials, or to identify those rare instances in which pottery had travelled over relatively long distances.

An extremely important addition to Anglo-Saxon pottery studies is Kevin Leahy's (2007a) method for classifying the decoration of cremation urns. He has already noted that it is applicable beyond the bounds of Cleatham, and this has been confirmed here by its successful application to the study of Elsham's cremation urns. His taxonomy allowed the distribution of decorative types within the cemeteries to be investigated and allowed comparison of the types of decoration found at the two cemeteries. Future scholars of Anglo-Saxon cemetery studies are urged to follow his method when attempting to identify localised potting traditions and community/household/family plots within the cemeteries.

Unfortunately, however, this thesis has shown that the phasing allied to Leahy's decorative groupings is not applicable beyond the Cleatham cemetery (Chapter 4). This is not unexpected, given the existence of local traditions, and the fact that these would not necessarily have progressed along the same developmental trajectory. It is imperative, then, that future analysts wishing to investigate the growth and development of early Anglo-Saxon cremation cemeteries do so on a cemetery by cemetery basis, taking into account any stratigraphic relationships that exist between the urns, as well as the evidence of datable finds. Finally, this study has also revealed the value of considering the decoration on all urns from cemetery assemblages, rather than focusing on those that belong to particular stamp groups or possess unusual forms of decoration.

Further Work

The results presented here open up a number of avenues for future research in Anglo-Saxon pottery and cemetery studies. For example, we have seen the different roles that specific forms might have played in the production and consumption of fermented drinks. As Richards (1987) has demonstrated that urns with above average rim diameters more frequently contained the remains of women, there is a distinct possibility that urn selections were made based upon gender and the roles that particular forms, and indeed people, played in the production and consumption of fermented produce. To investigate this possibility, the age and gender of the individuals who were found in the urns from Elsham and Cleatham now need to be considered alongside the new taxonomy of form. Moreover, an additional avenue of future study might be to investigate the role of women in the cremation ritual and the production of pottery. Indeed, it is often noted ethnographically that when pottery is produced at the household level, it is women who produce it (Peacock 1982, 8). Thus, if women in Anglo-Saxon England were the producers of pottery, as well as the producers and dispensers of fermented drinks, is it possible that they were also responsible for the selection of appropriate vessels for burial? It would be particularly interesting to investigate this further in light of Geake's (2003, 262-4) suggestion that so-called 'cunning women' (occasional female burials found with unusual grave goods) might have been in control of funerary practices. If this was the case in inhumation burials, as Geake suggests, surely it is feasible to expect that we might find a similar situation with respect to cremation.

Further support for the notion that the dead were being buried in family, household or community plots might be found by plotting the spatial distribution of different form-types throughout the cemeteries of Elsham and Cleatham. Indeed, numerous authors have noted that the forms of pottery are the most resistant to change, being the product of motor habits and dispositions gained during the learning process (e.g. Wallaert 2008, 179; Arnold 1989, 181; Gosselain 2000, 193; van der Leeuw 1993, 240). A plot of forms might, therefore, reveal the preferential use of particular types of vessel by different communities of practice. This further work would require as many forms as possible to be categorised according to the new typology (not only complete urns but fragmented urns with profiles that can be discerned). While this undertaking is likely to be hindered by poor preservation at many cemeteries, the present study has demonstrated the value of taking such an approach to even a small proportion of an assemblage.

This practice of re-using domestic vessels does not appear to be restricted to North Lincolnshire. Indeed, as was identified in Chapter 2, internal pitting, indicative of fermentation, was noted on the urns from Newark (Nottingham) (Kinsley 1989) and on the domestic pottery from Mucking (Hamerow 1993). It is recommended here that use-alteration analysis is carried out as a matter of course in future settlement and cemetery pottery studies in order that this phenomenon can be fully comprehended and its potential for furthering our understanding of Anglo-Saxon burial practices and pottery use fully exploited. Use-alteration studies of urns recovered from Migration Period cemeteries on the continent should also be undertaken. Indeed, until such analysis has taken place we will remain ignorant as to whether this phenomenon is restricted to Anglo-Saxon England. Further to this, analysis of absorbed residues should be undertaken on decorated pottery. Whilst residue analysis has been carried out on urns from cemetery assemblages in the past, the results have been inconclusive and have focused on the undecorated vessels that possess carbonised soot deposits (Hirst and Clark 2009, 603). It is imperative, then, that the focus now switches to analysing un-sooted, decorated urns. Such analysis could shed considerable light on the ingredients and the process involved in the production of fermented produce.

Whilst this study has shed considerable light on the catchment areas of large cremation cemeteries, there are also many smaller mixed-rite cemeteries that are often interspersed between the larger cemeteries, and these require consideration (Chapter 1). The next stage in the study of early Anglo-Saxon cemeteries from North Lincolnshire should be the classification of hand specimen fabrics of the pottery from these smaller cemeteries, and the comparison in thin section of this pottery with that from Elsham, Cleatham and non-funerary find-sites. Such analysis would perhaps provide insight in to which settlement sites where using these smaller cemeteries and, therefore, how these smaller cemeteries worked alongside their, often much larger, counterparts. Finally, a small number of thin section samples appear to have arrived at Elsham and Cleatham from sites in Yorkshire and southern and central Lincolnshire. These thin sections need to be compared with pottery from these areas to determine whether these vessels do indeed originate from these areas.

Final Words

This research has developed new, solid theoretical and methodological bases through which we can significantly enhance early Anglo-Saxon pottery studies. It has drawn together numerous, varied strands of ceramic analysis, allowing enormous advances to our understanding of early Anglo-Saxon crafts, social arrangements and burial practices. In combining use-alteration and thin section analysis with re-appraisals of the more traditionally studied aspects of early Anglo-Saxon pottery studies, the research has 'united in death' many facets of Anglo-Saxon social and burial practices, thereby providing a window on the pre-burial origins of Anglo-Saxon cremation urns.

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Appendix A

Appendix A: Corpus of Non-Funerary Pottery Find-Sites

Site_Code	Site Name	Description	Acc Number	SMR Number	Pastscape Number	NMR Number	Parish	NGR	Aditional References
AKAA	Countess Close, Alkborough	Three sherds of early Anglo-Saxon pottery were found during a programme of fieldwalking and trail trenching by Humber Field Archaeology in 2003. Late AS finds (LKT and TORK) from Countess Close were also deposited in NLM in 1967		20130			Alkborough	SE 879 216	NLMAD; Loughlin and Miller 1979 179-80
AKWW	Wescroft, Walcot	Site of Walcott Deserted Medieval Village, sherds recovered from surface scatters after earthworks were ploughed in 1965. Mostly medieval sherds, but mid or late saxon shellywares are also recorded.	SMAG:1978.029	45			Alkborough	SE877 208	NLPS; NLMAD; Loughlin and Miller 1979, 180
BBAJ	Barnetby-le-Wold. Site 3	Sherds recovered from fieldwalking south of Barnetby-le-Wold village	NOLMS:2004.123.001				Barnetby le Wold	TA05590884	NLMAD
BBAL	Barnetby-le-Wold. Site 1	Sherds recovered from fieldwalking south of Barnetby-le-Wold village	No 18 NOLMS:2005.033.007 (003)				Barnetby le Wold	TA05500880	NLMAD
BBAN	Barnetby-le-Wold. Site 6	Sherds recovered from fieldwalking south of Barnetby-le-Wold village	No 11 NOLMS:2005.115.003 (003) No 22 NOLMS:2009.115.(096)				Barnetby le Wold	TA05740864	NLMAD; NLPS
BBNB	Barnetby-le-Wold. Site A	Early and middle Saxon sherds recovered by fieldwalking around the village of Barnetby-le-Wold; Ipswich and Maxey wares were identified	NOLMS:1995.069.001				Barnetby le Wold	TA075 104	NLMAD; NLPS
BLAR	Sandtoft, East Side	Sherds recovered by fieldwalking east of Sandoft	SMAG:1988.014.034				Belton	SE734 089	NLMAD; SMR 901
BLBR	Sandtoft STE4		SMAG:1988.015.007				Belton		NLMAD;
BLCA	Belton BN XVI		SMAG:1988.015.043				Belton	SE79230600	NLMAD

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BNAM	New Vicarage Pottery, Barton-upon-Humber	Unstratified early and late Anglo-Saxon pottery recovered in foundation trenches.	BABDM:126				Barton-upon-Humber	TA034219	NLMAD
BNAS	Humber foreshore, near Hoe Hill Brickworks	Finds from the foreshore of the Humber, near Hoe Hill Brickworks. Material includes RB AS, med., post-med., pottery and glass.	145.74	438			Barton-upon-Humber	TA 038 236	NLPS; NLMAD; Loughlin and Miller 1979, 186
BNAX	Saxon Close	Finds made on building site at Saxon Close; finds include TORK and late Saxon shell temepred wares. Found in 1973.	BABDM.L24.K101.NUMBERS				Barton-upon-Humber	TA037 219	NLMAD; Loughlin and Miller 1979, 186
BNBE	Tyrwhitt Hall	Multi period finds made in the garden of Tyrwhitt Hall. Finds include RB, early and late AS, med., post-med. Features were excavated but not dated.		5015		TA 02 SW 52	Barton upon Humber	TA 0353 2193	NLMAD; Loughlin and Miller 1979, 186
BNPQ	33 Norman Close	Finds from 33 Norman Close, Barton. Mid AS and late AS pottery were also recorded.	NOLMS:2001:066:002				Barton-upon-Humber	TA 0369 2188	NLMAD
BOAG	Templar's Bath Field	Finds made at Templar's Bath - dedscibed as a 'hypocaust' by Loughlin and Miller 1979, 188, although Dudley suggests that the site refers to the Preceptory of the Knight's Templar	NOLMS:2002.023.008; NOLMS:2002.023.009				Bottesford	SE89770696	NLMAD; Loughlin and Miller 1979, 188; Dudley 1949, 178
BOBD	Holme Lane	Early AS material from Holme Lane, 1951. Finds also include RB greyware and samian sherds. Post-med., pottery also recovered.		6699	60783	SE80NE6	Bottesford	SE 8989 0729	Loughlin and Miller 1979, 188

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BSAA	Bagmoor Farm	Sherds of a large urn recovered from a cemetery south of Green Lane, Bagmoor Ironstone mine. Quarrying in 1928 destroyed the cemetery. Two urns were preserved and deposited in NLM. Skeletons were also reported by workmen	BSAA91				Burton-upon-Stather	SE90 16	Meaney 1964, 152; Webster and Webster and Myres 1951, 92, 93, 96, Fig 12 4e; Loughlin and Miller 1979, 193
BSAD	Bagmoor, Field 7	Multi period finds from Bagmoor Field 7 including early AS and med sherds and flint inplementes.		14080			Burton-upon-Stather	SE 897 163	Webster and Webster and Myres 1951, 92, 93, 96; Loughlin and Miller 1979, 193
BSAE	Bagmoor, Field 8	Multiperiod finds from Bagmoor Field 8 including Rb pottery and flint tools. Anglo-Saxon finds include pottery, an iron knife, loom weight, bronze strap-end and a fragment of bone comb and suggest an 'Anglian hut site'	BSAE73 BSAE 66 BSAE 73	4983	60959	SE81NE6	Burton-upon-Stather	SE 8965 1651	NLMAD; NLPS; Dudley 1949, 233; Webster and Webster and Myres 1951, 92, 93, 96, Fig 12 4a-d; Loughlin and Miller 1979, 193
CAAG	Caistor	Multi-period finds	NOLMS:1994.071.1				Caistor	TA113 008	NLMAD
CRWA	Crosby Warren	Multi-period finds, including flint tools, BA and RB pottery, from a 'sandy patch S of Keeper's Cottage'		1933			Scunthorpe	SE 905 130	NLMAD; Loughlin and Miller 1979, 236
CRWB	Crosby Warren, Keeper's (Dent's) Cottage	Flint tools, RB and early Anglo-Saxon finds 'near Dent's (the keeper) cottage'		1929	63887	SE 91 SW 47	Scunthorpe	SE 9087 1328	NLMAD; Loughlin and Miller 1979, 236
CRWE	Crosby Warren	Flint tools, 'beaker ware', RB pottery and and early Anglo-Saxon finds from the vacinity of 'Dent's Cottage' (the Keeper's Cottage), 1934.		1871	63784	SE 91 SW 9	Scunthorpe	SE 9073 1339	NLMAD; Loughlin and Miller 1979, 236
CWBG	Crowle, Field CE II		SMAG:1988.016.045				Crowle	SE77831272	

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Site_Code	Site Name	Description	Acc Number	SMR Number	Pastscape Number	NMR Number	Parish	NGR	Aditional References
ELAI	Field west of Elsham village	Assemblage of sherds from a field west of Elsham village. This includes Maxey and Ipswich type wares and may thus indiacte middle rather than early Anglo-Saxon occupation	NOLMS:1997.090.002				Elsham	TA031 126	NLMAD; NLPS
ELAN	Elsham	Pottery finds including Maxey type ware therefore may be of middle Saxon date	NOLMS:2005.027.001				Elsham		NLMAD
ELBA	Elsham	Pottery sherds from Elsham. Sherds are labeled May 1959		2325			Elsham	NA	NLMAD; NLPS; Loughlin and Miller 1979, 197
ELBB	Elsham	Multi-period finds including, flint tools, RB pottery and early AS pottery sherds found by fieldwalking, in 1973 and 1975, in advance of motorway construction					Elsham	TA048109	Loughlin and Miller 1979, 197;
ELXX	Elsham	Sherds from an unnamed site, however they are deposited in NLM with a number of AS disc and criuciform brooches. Perhaps they derive from the cemetery	NOLMS:1999.055				Elsham	TA031125	NLMAD
FXAE	Grangebeck North	Finds from the field east of the Fir Bed plantation, near the top of Granebeck Hill. Multi period finds including pre-historic pottery, RB pottery. As well as AS pottery fragments of loomweight were also discovered		1970	61056	SE 8875 1474	Flixborough	SE 887 148	Dudley 1949, 234; Loughlin and Miller 1979, 198; NLMAD; NLPS

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Site_Code	Site Name	Description	Acc Number	SMR Number	Pastscape Number	NMR Number	Parish	NGR	Aditional References
FXAF	Grangebeck North	Finds from the field east of the Fir Bed plantation, near the top of Granebeck Hill. Multi period finds including pre-historic pottery, RB pottery. As well as AS pottery, fragments of loomweight were also discovered		1970	61056	SE 8875 1474	Flixborough	SE 8878 1487	Dudley 1949, 234; Loughlin and Miller 1979, 198; NLMAD; NLPS
GXBA	Goxhill (foreshore)	Multiperiod finds from the form the foreshore of East Halton Skitter including late AS TORK; med and Rb pottery.	NOLMS:83.73.1				Goxhill	TA147231	Loughlin and Miller 1979, 198; NLMAD; NLPS
GXBC	Goxhill	Multiperiod finds from the foreshore includinf early AS, RB, med, post med pottery and a whetstones	SMAG: 1991:445.065 ALSO BABDM:450.2				Goxhill	TA147 235	Loughlin and Miller 1979, 198; NLMAD;
HBBB	Manton Lane, Hibaldstow	Finds from 'fields surrounding excavation', though no record of which excavation could be traced. Multiple excavations are recorded, however, by Loughlin and Miller 1979, 199					Hibaldstow	SE962 033	Loughlin and Miller 1979, 199; NLMAD
HORJ	Bottesford Beck	Nature of site undetermined	NOLMS:2002.071				Holme	SE900 068	NLMAD
KLAT	2 Ings Road Garden	Finds from the garden of 2, Ings Road, Kirton in Lindsey, Gainsborough	NOLMS:2006.032.001				Kirton in Lindsay	SK 93429877	NLMAD;
KSWY	Whingale Priory	Pottery from exacavatoin at Whinghale Priory. Other finds include animal bone from a pit and early AS copper alloy dress accessories	SMAG:10:3.1981/8				South Kelsey	TF029 968	NLMAD

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Site_Code	Site Name	Description	Acc Number	SMR Number	Pastscape Number	NMR Number	Parish	NGR	Aditional References
MRBD	5 Council Villas	Early and late Anglo Saxon pottery found from the Garden of 5 Council Villas. An AS knife tweezers and decorated bead were also found. Further early AS and med. finds were made by fieldwalking south of Council Villas (SMR 19960) in 2003-6	NOLMS: 1996:150.003 (005)				Meton Ross	TA07281060	NLMAD
MRBF	Melton Ross, Welbecks Spring Site	RB and early Anglo Saxon pottery found at Welbeck Spring. From the same NGR the NLMAD also records 32 pieces of eight- and ninth-century metalwork, including pins, mounts, and strap-ends. A styca was also found.	NOLMS:1995.069.2.	20334			Melton Ross	TA071103	NLMAD
MSAB	Mell's Farm	An 'Anglian hut site' among sand hills east of the Messingham-Kirton Road, opposite Mell's Farm, cerammic and glass beeds, a fragment of a brooch, and iron slag were also found. The site also apears to be in the vacinity of a Romano-British settlement.		2190	63520	SE 90 SW 3	Messingham	SE91040340	NLMAD; Loughlin and Miller 1979, 206, Webster and Myres 1951, 92, 98, Fig 13, 3a-b; Dudley 1949, 234-5
MSBV	Belle Vue Farm	Finds from sand hills around Belle Vue Farm. Material includes early Anglo Saxon pottery, flint tools and cores, Romano-British pottery, beads, coins and metalwork.		2181	63512	SE 90 SE 1	Messingham	SE 915 042	NLMAD; Loughlin and Miller 1979, 205;
MSBW	Belle Vue Farm	Finds of early Anglo-Saxon pottery from sandhills to the east of Belle Vue farm		2188	63613	SE 90 SW 44	Messingham	SE 920 043	Loughlin and Miller 1979, 205; NLPS; NLMAD

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Site_Code	Site Name	Description	Acc Number	SMR Number	Pastscape Number	NMR Number	Parish	NGR	Aditional References
MSHB	Messingham	Fieldwalked sherds from Messingham. The material appears to derive from the Mell's Farm site as it is illustrated by Myres alongside other material from Mell's Farm.	NOLMS:64.77				Messingham	SE91040340	NLPS; Webster and Webster and Myres 1951, Fig 12a
MSMB	Mell's Farm	Further early AS material found in sandhills 500m north of Mell's Farm, including iron slag and glass beads.					Messingham	SE90800390	Loughlin and Miller 1979 206; Webster and Webster and Myres 1951, Fig 12, 3a; Dudley 1949, 234-5;
MTAS	Gilliate's Grave	Material recovered from Gilliate's Grave. This, a RB cremation cemetery was excavated in 1951;					Manton	SE93950343	Loughlin and Miller 1979, 204; NLMAD;
MTBV	Manton						Manton	SE938 035	
MTBX	Manton Warren	Further finds from MTDB. Material includese Anglo-Saxon pottery, a loomweight, whetstone, iron slag and an iron axe-head.	SMAG:1974.123; SMAG:1990.121.001; SMAG:1974.123				Manton	SE939 037	Loughlin and Miller 1979, 204; NLMAD; Webster and Webster and Myres 1951, 98.
MTCC	Manton Site 3	Anglo-Saxon pottery recoverd from a presumaably fieldwalked site. Other finds included pre-historic stone tools.		15815	63589	SE 90 SW 34	Manton	SE 9390 0421	Loughlin and Miller 1979, 204; NLMAD
MTCF	Manton Site 6; east of middle Manton	Finds presumabley recovered in the same fieldwalking campaing as MTCC. Microliths and other flint tools were also recovered.		15814	63592	SE 90 SW 35	Manton	SE 9387 0395	Loughlin and Miller 1979, 204
MTCH	Greetwell Hall, Manton	Finds from on 'top of a hill, opposite Greetwell Hall Farm'. Iron slag was also found on this hillside and Dudley suggests an 'Anglian hut site' at the foot of the hill.		2163	63601	SE 90 38	Manton	SE 9343 0470	Loughlin and Miller 1979, 204; Dudley 1949, 143; NLMAD;

Appendix A: Corpus of Non-Funerary Pottery Find-Sites

Site_Code	Site Name	Description	Acc Number	SMR Number	Pastscape Number	NMR Number	Parish	NGR	Aditional References
MTDB	Manton Warren, next to Gilliate's Grave	Four Romano-British hut sites excavated by Scunthorpe museum in 1951. Finds included a range of first- to fourth-century pottery. Also recovered were fragments of Anglo Saxon and medieval pottery. Finds relate to MTBX	MTDB 12: SMAG:1951.01				Manton	SE93970384	Loughlin and Miller 1979, 204; NLMAD; Webster and Webster and Myres 1951, 98.
MTFW	East of Middle Manton	Multi period finds from fieldwalking in 1982		3081			Manton	SE 941 035	
OS0003	North Linclonshire Museum Fieldwalked Site	Fieldwalking in 2000 of OS parcel 0003; multi period finds of post Roman pottery, early Anglo-Saxon, medieval and post medieval		19912			Manton	SE 940 029	
OS0033	North Linclonshire Museum Fieldwalked Site	Fieldwalking in 2003; finds include Roman greyware, early Anglo Saxon, medieval, post medieval and modern sherds.		20237			Manton	SE 938 033	
OS0034	North Linclonshire Museum Fieldwalked Site	Fieldwalking of Gilliates Grave in 2004. Finds include Iron Age, Roman, and Anglo-Saxon pottery		20538			Manton	SE93910345	
OS0093	North Linclonshire Museum Fieldwalked Site	Fieldwalking in 2006. Finds include Anglo-Saxon, medieval and post-medieval, and modern pottery.		20687			Elsham	TA 0423 1187	
OS0528	North Linclonshire Museum Fieldwalked Site	Finds from Fielwalking in 2003 and 2006. Anglo-Saxon sherds were located close to a scatter of Roman material through to derive from late Roman structures.		20408			Alkborough	SE 89085 23105	

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Site_Code	Site Name	Description	Acc Number	SMR Number	Pastscape Number	NMR Number	Parish	NGR	Aditional References
OS1752	North Linclonshire Museum Fieldwalked Site	Fieldwalking at Grange Farm produced early and late Saxon pottery. The assemblge was dominated by post medieval and moderan pottery. Medieval pottery was also recovered.		20514			Kirton in Lindsay	SK 9418 9956	
OS2074	North Linclonshire Museum Fieldwalked Site	Fielwalking in a small field south of Cleatham village in 2000 produced Roman, Anglo-Saxon, medieval and post-medieval, and modern pottery.		19916			Manton	SE 93134 00788	
OS3000	North Linclonshire Museum Fieldwalked Site	Fieldwalking east of Elsham in 2006 recovered Anglo-Saxon, medieval and post-medieval, and modern pottery.		20683			Elsham	TA 044 121	
OS3137	North Linclonshire Museum Fieldwalked Site	Fieldwalking in 1999 produced Anglo-Saxon, medieval and post-medieval, and modern pottery.		19852			Kirton in Lindsay	SK 953 993	
OS3400	North Linclonshire Museum Fieldwalked Site	Fieldwalking in 2007 produced Roman, Anglo-Saxon, medieval and post-medieval, and modern pottery.		21262			Elsham	TA04051313	
OS4757	North Linclonshire Museum Fieldwalked Site	Fieldwalking of Old Winteringham in 2008 produced a large assemblahge of Roman pottery. Small assemblages of Anglo-Saxon, medieval and post-medieval, and modern pottery were also recovered.		21363			Winteringham	SE 943 215	
OS5500	North Linclonshire Museum Fieldwalked Site	Fieldwalking north of Manton village in 2000 produced. The majority of material is late Saxon but early material was also found.		19923			Manton	SE 9362 0314	

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Site_Code	Site Name	Description	Acc Number	SMR Number	Pastscape Number	NMR Number	Parish	NGR	Aditional References
OS5555	North Linclonshire Museum Fieldwalked Site	Fieldwalking at grange Farm in 2001 produced Roman, Anglo-Saxon, medieval and post-medieval, and modern pottery.		19993			Kirton in Lindsay	SK 945 995	
OS6223	North Linclonshire Museum Fieldwalked Site	Fieldwalking north of Owston Ferry in 2002 produced Anglo-Saxon, medieval and post-medieval, and modern pottery.		20191			Owston Ferry	SE 806 012	
OS6500	North Linclonshire Museum Fieldwalked Site	Fielwalking north of Mont Pleasant in 2002 recovered early and late Saxon material.		20195			Owston Ferry	SE 8070 0111	
OS6838	North Linclonshire Museum Fieldwalked Site	Pottery recovered through fieldwalking at Ings Farm in 2001. Finds include Anglo-Saxon, medieval and post-medieval, and modern pottery.		19998			Kirton in Lindsay	SK 926 993	
OS7354	North Linclonshire Museum Fieldwalked Site	Fieldwalking south of Ings Lane in 2006 recovered ealry and late Anglo-Saxon pottery, medieval, post-medieval and modern pottery.		20737			Whitton	SE 90657 23534	
OS8500	North Linclonshire Museum Fieldwalked Site	Fieldwalking in 2003 recovered early Anlgo-Saxon pottery. A spear and loomweights have also been reported in the locality.		20234			Manton	SE 936 027	
OS9075	North Linclonshire Museum Fieldwalked Site	Fieldwalking east of Alkborough, south of Huteson Lane, in 2008, recovered Anglo-Saxon, medieval and post-medieval, and modern pottery.		21356			Alkborough	SE 8890 2176	

Appendix A: Corpus of Non-Funerary Pottery Find-Sites

Site_Code	Site Name	Description	Acc Number	SMR Number	Pastscape Number	NMR Number	Parish	NGR	Aditional References
OS9109	North Linclonshire Museum Fieldwalked Site	Fieldwalking at Lawms farm recovered are large assemblage of post Roman pottery, including Anglo-Saxon, medieval and post-medieval, and modern material.		20211			Epworth	SE 789 050	
RXSN	Ryecliffe Field	Although Loughlin and Miller 1979 do not include early Anglo-Saxon pottery amongst the finds from this site, finds from Rycliffe Field, RXSN, include pre-historic flint tools and pottery. Finds were recovered from the 'sandy crest of the escarpment'.	SE911 166				Roxby cum Risby	SE911166	Loughlin and Miller 1979, 209; NLPS
SFAG	South Ferriby Primary School	See AVAC database and Chris Clay 2006 Land off Horkstow Road	NOLMS:2007.021.006.(NUMBERS)				South Ferriby	SE98602063	
SNAC	Scotton B	Pottery finds from within the are the 'angle of the river Eau and Scotton Beck'. Also found were an Anglo-Saxon iron knife and scraps of bronze.					Scotton	SK893 996	Dudley 1949, 235; Webster and Webster and Myres 1951, 89, 92-3, 98, Fig 9.7a-b, 12.7.
TCBB	Burnham Beaches Thornton Curtis	Finds made in 1951		2241	78805	TA 01 NW 1	Thornton Curtis	TA 0461 1663	
THAB	Thealby Ironstone Mine	Site exposed during iron mining, 1909-1936. Excavations revealed a late IA/early RB smelting furnace. Finds include RB metal work, pottery and iron slag. Anglo-Saxon finds include a bone comb, pottery, loomweight and a knife. Myres suggests a dom site		1110	63672	SE 91 NW 7	Burton upon Stather	SE 904 181	NLMAD; Webster and Webster and Myres 1951, 89, 99, 89, Fig 9.6; Dudley 235; Loughlin and Miller 1979, 194

Appendix A: Corpus of Non-Funerary Pottery Find-Sites

Site_Code	Site Name	Description	Acc Number	SMR Number	Pastscape Number	NMR Number	Parish	NGR	Aditional References
THDD	Thealby	Furface finds from topsoil. Finds also include RB, med., post-med. And iron slag.			1063816	SE91NW47	Burton upon Stather	SE 902 185	Loughlin and Miller 1979, 194; NLMAD
WGMCL	Hewde Lane, Winteringham	Sherd of Anlgian pottery from a field bordering Hewde Lane. RB, med. And post-med. pottery also found		10626			Winteringham	SE 927 222	NLMAD
WHA	West Halton, Village Green	Multi Period site excavated by University of Sheffield		20108			West Halton	SE 90478 20895	Hadley *et al.* 2011; Perry 2009a
WRAAI	Near Elaham Station	Surface finds from fieldwlaking and soil stripping aead of motorway construction. RB features were revealed but not excavated.	NOLMS:64.77	2233			Wrawby	TA021 102	NLPS

Notes on Additional References:

NLMAD = North Lincolnshire Museum Accession Database
NLPS = North Lincolnshire Parish Survey

Appendix B:

Form Group Images for Elsham and Cleatham Urns

Rites have not been obtained for the use of these images in electronic media

1Ai

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volume
71	297	250	160	138	1.19	0.64	1.77	0.46	1Ai	8.8
60	296	277	130	160	1.07	0.47	0.93	0.54	1Ai	9
265	310	266	147	150	1.17	0.55	1.34	0.48	1Ai	9.3
371	270	255	130	155	1.06	0.51	0.92	0.57	1Ai	7.4
373	282	246	115	154	1.15	0.47	0.98	0.55	1Ai	7.6
137	306	276	167	160	1.11	0.61	1.34	0.52	1Ai	9.3
242	294	263	140	146	1.12	0.53	1.20	0.50	1Ai	10.4
285	300	270	130	140	1.11	0.48	1.14	0.47	1Ai	9.9
396	302	251	132	122	1.20	0.53	1.51	0.40	1Ai	8.6
479	302	264	142	118	1.14	0.54	1.51	0.39	1Ai	9
492	280	253	145	128	1.11	0.57	1.41	0.46	1Ai	8.1
498	262	265	135	144	0.99	0.51	0.91	0.55	1Ai	7.7
509	303	270	140	122	1.12	0.52	1.39	0.40	1Ai	9.6
768	300	244	135	108	1.23	0.55	1.76	0.36	1Ai	6.9
865	316	250	130	124	1.26	0.52	1.60	0.39	1Ai	8.6
887	290	269	130	120	1.08	0.48	1.22	0.41	1Ai	8.4
900	277	277	115	105	1.00	0.42	1.06	0.38	1Ai	6.6
911	300	245	115	120	1.22	0.47	1.38	0.40	1Ai	7.7
1000	302	262	135	110	1.15	0.52	1.51	0.36	1Ai	8.6
58	250	253	125	100	0.99	0.49	1.17	0.40	1Ai	5.3
336	273	270	140	110	1.01	0.52	1.25	0.40	1Ai	7.3
566	264	250	130	120	1.06	0.52	1.20	0.45	1Ai	6.6
788	260	257	145	120	1.01	0.56	1.25	0.46	1Ai	6.6
791	296	254	132	122	1.17	0.52	1.43	0.41	1Ai	7.1
Mean	288.83	259.88	135.21	129.00	**1.11**	**0.52**	**1.30**	**0.45**		**8.10**
Min	250.00	244.00	115.00	100.00	0.99	0.42	0.91	0.36		5.30
Max	316.00	277.00	167.00	160.00	1.26	0.64	1.77	0.57		10.40
Std Dev	17.46	10.27	12.22	17.77	**0.08**	**0.05**	**0.24**	**0.06**		**1.21**

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
415	215	205	110	88	1.05	0.54	1.34	0.41	1Aii	3.8
422	240	230	130	110	1.04	0.57	1.30	0.46	1Aii	
344	220	194	90	86	1.13	0.46	1.29	0.39	1Aii	4
520	246	219	130	122	1.12	0.59	1.39	0.50	1Aii	5.8
536	262	227	130	116	1.15	0.57	1.51	0.44	1Aii	5.8
548	224	229	95	92	0.98	0.41	0.99	0.41	1Aii	3.9
577	240	223	100	86	1.08	0.45	1.25	0.36	1Aii	4.4
261	234	244	116	94	0.96	0.48	1.09	0.40	1Aii	4.6
594	250	227	125	90	1.10	0.55	1.57	0.36	1Aii	5.2
699	230	204	120	110	1.13	0.59	1.43	0.48	1Aii	4.4
728	222	180	110	95	1.23	0.61	1.81	0.43	1Aii	3.4
861	220	222	100	86	0.99	0.45	1.10	0.39	1Aii	3.5
890	244	223	128	114	1.09	0.57	1.37	0.47	1Aii	5.2
988	237	216	125	117	1.10	0.58	1.32	0.49	1Aii	4.7
1004	257	233	110	110	1.10	0.47	1.20	0.43	1Aii	6
Mean	236.07	218.40	114.60	101.07	**1.08**	**0.53**	**1.33**	**0.43**		**4.62**
Min	215.00	180.00	90.00	86.00	0.96	0.41	0.99	0.36		3.40
Max	262.00	244.00	130.00	122.00	1.23	0.61	1.81	0.50		6.00
Std Dev	13.77	15.88	13.21	12.82	**0.07**	**0.06**	**0.20**	**0.04**		**0.84**

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
56	236	215	100	126	1.10	0.47	0.96	0.53	1Bi	4.5
12	240	208	82	133	1.15	0.39	0.85	0.55	1Bi	5.2
136	252	219	115	126	1.15	0.53	1.21	0.50	1Bi	5.9
204	236	194	95	114	1.22	0.49	1.23	0.48	1Bi	4.6
200	262	215	106	130	1.22	0.49	1.21	0.50	1Bi	5.5
216	260	217	105	122	1.20	0.48	1.23	0.47	1Bi	6
255	240	170	100	98	1.41	0.59	2.03	0.41	1Bi	4.4
283	264	193	95	134	1.37	0.49	1.33	0.51	1Bi	5.2
364	260	221	108	138	1.18	0.49	1.08	0.53	1Bi	5.5
458	283	218	90	140	1.30	0.41	1.12	0.49	1Bi	6.2
513	248	200	90	128	1.24	0.45	1.09	0.52	1Bi	4.4
523	261	210	110	100	1.24	0.52	1.61	0.38	1Bi	6.2
573	262	210	105	118	1.25	0.50	1.37	0.45	1Bi	4.6
582	250	195	100	127	1.28	0.51	1.29	0.51	1Bi	5
598	280	194	110	132	1.44	0.57	1.76	0.47	1Bi	5.7
773	262	215	100	125	1.22	0.47	1.19	0.48	1Bi	5.7
889	266	212	105	127	1.25	0.50	1.30	0.48	1Bi	4.9
944	230	189	80	124	1.22	0.42	0.97	0.54	1Bi	4
951	235	206	100	115	1.14	0.49	1.13	0.49	1Bi	4.2
991	284	211	100	138	1.35	0.47	1.32	0.49	1Bi	6
1104	260	218	110	122	1.19	0.50	1.28	0.47	1Bi	6
1105	258	216	110	120	1.19	0.51	1.30	0.47	1Bi	5
Mean	255.86	206.64	100.73	124.41	**1.24**	**0.49**	**1.27**	**0.49**		**5.21**
Min	230.00	170.00	80.00	98.00	1.10	0.39	0.85	0.38		4.00
Max	284.00	221.00	115.00	140.00	1.44	0.59	2.03	0.55		6.20
Std Dev	15.05	12.49	8.95	10.58	**0.09**	**0.04**	**0.26**	**0.04**		**0.68**

1Bii

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
172	214	178	85	103	1.20	0.48	1.19	0.48	1Bii	3.4
129	236	200	95	142	1.18	0.48	0.90	0.60	1Bii	3.5
175	230	180	70	120	1.28	0.39	1.00	0.52	1Bii	3
171	200	175	90	104	1.14	0.51	1.13	0.52	1Bii	2.5
196	202	187	90	90	1.08	0.48	1.15	0.45	1Bii	2.7
214	222	186	88	114	1.19	0.47	1.10	0.51	1Bii	3.7
286	210	180	90	114	1.17	0.50	1.07	0.54	1Bii	2.9
361	204	186	91	86	1.10	0.49	1.24	0.42	1Bii	3
404	202	196	90	112	1.03	0.46	0.85	0.55	1Bii	3
562	224	171	95	102	1.31	0.56	1.61	0.46	1Bii	3.2
211	224	180	75	126	1.24	0.42	0.93	0.56	1Bii	2.9
279	230	182	90	140	1.26	0.49	0.98	0.61	1Bii	3.6
333	204	180	75	120	1.13	0.42	0.80	0.59	1Bii	2.7
585	213	184	95	92	1.16	0.52	1.36	0.43	1Bii	3
640	220	197	95	116	1.12	0.48	1.02	0.53	1Bii	3.8
934	220	185	90	104	1.19	0.49	1.22	0.47	1Bii	3.2
977	204	177	85	100	1.15	0.48	1.13	0.49	1Bii	2.5
957	218	190	90	118	1.15	0.47	1.00	0.54	1Bii	3.5
Mean	215.39	184.11	87.72	111.28	**1.17**	**0.48**	**1.09**	**0.52**		**3.12**
Min	200.00	171.00	70.00	86.00	1.03	0.39	0.80	0.42		2.50
Max	236.00	200.00	95.00	142.00	1.31	0.56	1.61	0.61		3.80
Std Dev	10.84	7.55	7.12	15.04	**0.07**	**0.04**	**0.19**	**0.06**		**0.39**

1Biii

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
318	170	140	70	81	1.21	0.50	1.27	0.48	1Biii	1.2
394	166	145	76	72	1.14	0.52	1.36	0.43	1Biii	
183	170	143	65	101	1.19	0.45	0.88	0.59	1Biii	1.4
528	150	150	55	90	1.00	0.37	0.63	0.60	1Biii	1.3

Mean	164.00	144.50	66.50	86.00	**1.14**	**0.46**	**1.04**	**0.53**		**1.30**
Min	150.00	140.00	55.00	72.00	1.00	0.37	0.63	0.43		1.20
Max	170.00	150.00	76.00	101.00	1.21	0.52	1.36	0.60		1.40
Std Dev	8.25	3.64	7.70	10.75	**0.08**	**0.06**	**0.30**	**0.07**		**0.08**

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
52	236	217	110	122	1.09	0.51	1.07	0.52	1Di	3.6
98	230	210	125	140	1.10	0.60	1.06	0.61	1Di	3.7
293	242	228	120	136	1.06	0.53	0.98	0.56	1Di	5.2
328	228	222	132	118	1.03	0.59	1.22	0.52	1Di	4.2
353	234	221	124	120	1.06	0.56	1.18	0.51	1Di	5
471	230	225	110	116	1.02	0.49	0.99	0.50	1Di	4.5
544	235	230	100	126	1.02	0.43	0.84	0.54	1Di	4.5
624	224	203	110	122	1.10	0.54	1.10	0.54	1Di	3.4
693	224	222	120	126	1.01	0.54	0.96	0.56	1Di	4.4
730	220	215	120	118	1.02	0.56	1.07	0.54	1Di	3.7
807	242	215	115	132	1.13	0.53	1.10	0.55	1Di	5
870	217	209	115	130	1.04	0.55	0.93	0.60	1Di	3.8
Mean	230.17	218.08	116.75	125.50	**1.06**	**0.54**	**1.04**	**0.55**		**4.25**
Min	217.00	203.00	100.00	116.00	1.01	0.43	0.84	0.50		3.40
Max	242.00	230.00	132.00	140.00	1.13	0.60	1.22	0.61		5.20
Std Dev	7.69	7.76	8.21	7.31	**0.04**	**0.04**	**0.10**	**0.03**		**0.59**

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
830	180	188	90	107	0.96	0.48	0.74	0.59	1Dii	2.4
845	197	204	95	113	0.97	0.47	0.77	0.57	1Dii	3
851	178	179	105	104	0.99	0.59	1.00	0.58	1Dii	2.2
1070	200	198	90	122	1.01	0.45	0.72	0.61	1Dii	2.8
829	200	205	85	120	0.98	0.41	0.67	0.60	1Dii	3.4
600	188	189	110	102	0.99	0.58	1.09	0.54	1Dii	2.4
739	196	194	100	110	1.01	0.52	0.91	0.56	1Dii	
Mean	191.29	193.86	96.43	111.14	**0.99**	**0.50**	**0.84**	**0.58**		**2.70**
Min	178.00	179.00	85.00	102.00	0.96	0.41	0.67	0.54		2.20
Max	200.00	205.00	110.00	122.00	1.01	0.59	1.09	0.61		3.40
Std Dev	8.63	8.64	8.33	7.10	**0.02**	**0.06**	**0.15**	**0.02**		**0.41**

2Ai

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
83	274	185	105	180	1.48	0.57	1.18	0.66	2Ai	6
212	280	190	103	204	1.47	0.54	0.87	0.73	2Ai	6.6
270	302	192	100	198	1.57	0.52	1.13	0.66	2Ai	7.2
330	254	180	95	202	1.41	0.53	0.61	0.80	2Ai	5.1
370	263	177	108	173	1.49	0.61	1.30	0.66	2Bi	5.3
596	268	188	100	170	1.43	0.53	1.11	0.63	2Ai	5.5
689	288	198	90	202	1.45	0.45	0.80	0.70	2Ai	6.3
815	278	193	95	192	1.44	0.49	0.88	0.69	2Ai	6
Mean	275.88	187.88	99.50	190.13	**1.47**	**0.53**	**0.99**	**0.69**		**6.00**
Min	254.00	177.00	90.00	170.00	1.41	0.45	0.61	0.63		5.10
Max	302.00	198.00	108.00	204.00	1.57	0.61	1.30	0.80		7.20
Std Dev	13.97	6.51	5.55	12.95	**0.05**	**0.04**	**0.22**	**0.05**		**0.66**

2Bi

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Voumes
109	240	165	110	140	1.45	0.67	1.82	0.58	2Bi	3.1
115	240	180	100	144	1.33	0.56	1.20	0.60	2Bi	3.8
176	244	182	105	170	1.34	0.58	0.96	0.70	2Bi	4.1
308	246	164	85	178	1.50	0.52	0.86	0.72	2Bi	3.5
454	240	182	110	156	1.32	0.60	1.17	0.65	2Bi	4.2
460	224	159	96	143	1.41	0.60	1.29	0.64	2Bi	3.5
488	236	165	90	144	1.43	0.55	1.23	0.61	2Bi	3.4
521	226	177	100	138	1.28	0.56	1.14	0.61	2Bi	4
572	244	172	100	180	1.42	0.58	0.89	0.74	2Bi	4.2
587	245	176	95	172	1.39	0.54	0.90	0.70	2Bi	4.6
636	242	180	100	142	1.34	0.56	1.25	0.59	2Bi	4.1
641	256	165	95	174	1.55	0.58	1.17	0.68	2Bi	4.2
704	224	162	85	142	1.38	0.52	1.06	0.63	2Bi	3.3
871	242	160	80	166	1.51	0.50	0.95	0.69	2Bi	3.7
956	232	152	90	140	1.53	0.59	1.48	0.60	2Bi	3
978	220	168	90	138	1.31	0.54	1.05	0.63	2Bi	2.8
391	233	183	120	154	1.27	0.66	1.25	0.66	2Bi	3.8
1031	254	166	75	162	1.53	0.45	1.01	0.64	2Bi	4.4
1103	234	184	105	140	1.27	0.57	1.19	0.60	2Bi	3
Mean	238.00	170.63	96.37	153.84	**1.40**	**0.56**	**1.15**	**0.65**		**3.72**
Min	220.00	152.00	75.00	138.00	1.27	0.45	0.86	0.58		2.80
Max	256.00	184.00	120.00	180.00	1.55	0.67	1.82	0.74		4.60
Std Dev	9.60	9.39	10.86	14.78	**0.09**	**0.05**	**0.22**	**0.05**		**0.51**

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
89	310	236	120	196	1.31	0.51	0.98	0.63	3Ai	10.4
91	280	213	115	198	1.31	0.54	0.84	0.71	3Ai	7.2
291	248	203	100	170	1.22	0.49	0.76	0.69	3Ai	5.5
306	268	206	110	182	1.30	0.53	0.90	0.68	3Ai	6
326	282	224	120	204	1.26	0.54	0.75	0.72	3Ai	8.2
384	284	236	140	194	1.20	0.59	0.94	0.68	3Ai	8.4
386	260	204	100	183	1.27	0.49	0.74	0.70	3Ai	6.9
398	300	215	105	213	1.40	0.49	0.79	0.71	3Ai	8.3
742	292	232	130	224	1.26	0.56	0.67	0.77	3Ai	9
895	278	210	115	198	1.32	0.55	0.84	0.71	3Ai	6.9
897	300	228	120	200	1.32	0.53	0.93	0.67	3Ai	9.2
Mean	282.00	218.82	115.91	196.55	**1.29**	**0.53**	**0.83**	**0.70**		**7.82**
Min	248.00	203.00	100.00	170.00	1.20	0.49	0.67	0.63		5.50
Max	310.00	236.00	140.00	224.00	1.40	0.59	0.98	0.77		10.40
Std Dev	17.56	12.19	11.64	14.15	**0.05**	**0.03**	**0.09**	**0.03**		**1.40**

3Aiii

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
121	175	135	77	105	1.30	0.57	1.21	0.60	3Aiii	1.5
90	160	128	65	100	1.25	0.51	0.95	0.63	3Aiii	1.02
124	160	125	70	106	1.28	0.56	0.98	0.66	3Aiii	1.03
304	158	122	63	115	1.30	0.52	0.73	0.73	3Aiii	1.1
470	176	128	70	60	1.38	0.55	2.00	0.63	3Aiii	1.3
431	145	109	56	110	1.33	0.51	0.66	0.76	3Aiii	0.9
943	160	120	65	120	1.33	0.54	0.73	0.75	3Aiii	1.1
Mean	162.00	123.86	66.57	102.29	**1.31**	**0.54**	**1.04**	**0.68**		**1.14**
Min	145.00	109.00	56.00	60.00	1.25	0.51	0.66	0.60		0.90
Max	176.00	135.00	77.00	120.00	1.38	0.57	2.00	0.76		1.50
Std Dev	9.87	7.55	6.11	18.32	**0.04**	**0.02**	**0.43**	**0.06**		**0.19**

3Bi

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Vloumes
63	246	195	120	186	1.26	0.62	0.80	0.76	3Bi	5.2
64	246	198	120	194	1.24	0.61	0.67	0.79	3Bi	5.2
68	240	207	120	208	1.16	0.58	0.37	0.87	3Bi	5.6
233	250	180	90	210	1.39	0.50	0.44	0.84	3Bi	5.5
262	256	203	110	193	1.26	0.54	0.68	0.75	3Bi	5.7
327	242	192	95	174	1.26	0.49	0.70	0.72	3Bi	4.8
1026	250	195	110	180	1.28	0.56	0.82	0.72	3Bi	4.9
483	250	180	112	200	1.39	0.62	0.74	0.80	3Bi	4.4
938	255	168	95	206	1.52	0.57	0.67	0.81	3Bi	4.8
763	240	193	85	187	1.24	0.44	0.49	0.78	3Bi	4.9
1076	242	180	90	165	1.34	0.50	0.86	0.68	3Bi	4.7
1068	258	201	120	214	1.28	0.60	0.54	0.83	3Bi	6.3
Mean	247.92	191.00	105.58	193.08	**1.30**	**0.55**	**0.65**	**0.78**		**5.17**
Min	240.00	168.00	85.00	165.00	1.16	0.44	0.37	0.68		4.40
Max	258.00	207.00	120.00	214.00	1.52	0.62	0.86	0.87		6.30
Std Dev	6.01	11.10	13.05	14.64	**0.09**	**0.05**	**0.15**	**0.05**		**0.51**

3Bii

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
222	202	161	75	142	1.25	0.47	0.70	0.70	3Bii	3.6
332	220	169	95	150	1.30	0.56	0.95	0.68	3Bii	3.6
808	208	164	78	126	1.27	0.48	0.95	0.61	3Bii	2.8
80	222	174	88	160	1.28	0.51	0.72	0.72	3Bii	3
178	204	167	105	158	1.22	0.63	0.74	0.77	3Bii	3.1
316	196	159	85	152	1.23	0.53	0.59	0.78	3Bii	2.4
374	220	159	80	170	1.38	0.50	0.63	0.77	3Bii	3.3
459	190	145	80	158	1.31	0.55	0.49	0.83	3Bii	2.3
468	214	167	75	186	1.28	0.45	0.30	0.87	3Bii	3.5
534	214	162	82	162	1.32	0.51	0.65	0.76	3Bii	2.9
864	196	147	73	156	1.33	0.50	0.54	0.80	3Bii	2.8
875	226	156	75	180	1.45	0.48	0.57	0.80	3Bii	3.4
1097	200	148	65	162	1.35	0.44	0.46	0.81	3Bii	2.5
976	220	178	100	155	1.24	0.56	0.83	0.70	3Bii	3.2
1100	232	165	95	180	1.41	0.58	0.74	0.78	3Bii	3.7
Mean	210.93	161.40	83.40	159.80	**1.31**	**0.52**	**0.66**	**0.76**		**3.07**
Min	190.00	145.00	65.00	126.00	1.22	0.44	0.30	0.61		2.30
Max	232.00	178.00	105.00	186.00	1.45	0.63	0.95	0.87		3.70
Std Dev	12.11	9.21	10.79	14.78	**0.06**	**0.05**	**0.17**	**0.06**		**0.44**

3Biii

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
4	160	112	65	132	1.43	0.58	0.60	0.83	3Biii	1.3
590	180	140	70	122	1.29	0.50	0.83	0.68	3Biii	1.8
616	175	135	70	137	1.30	0.52	0.58	0.78	3Biii	1.7
123	190	133	75	135	1.43	0.56	0.95	0.71	3Biii	1.7
358	172	130	65	132	1.32	0.50	0.62	0.77	3Biii	1.6
397	182	142	85	124	1.28	0.60	1.02	0.68	3Biii	1.8
789	185	148	70	112	1.25	0.47	0.94	0.61	3Biii	1.7

Mean	177.71	134.29	71.43	127.71	**1.33**	**0.53**	**0.79**	**0.72**		**1.66**
Min	160.00	112.00	65.00	112.00	1.25	0.47	0.58	0.61		1.30
Max	190.00	148.00	85.00	137.00	1.43	0.60	1.02	0.83		1.80
Std Dev	9.11	10.67	6.39	8.19	**0.07**	**0.04**	**0.17**	**0.07**		**0.16**

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
383	282	245	140	168	1.15	0.57	1.09	0.60	4Ai	7.3
567	272	241	160	158	1.13	0.66	1.41	0.58	4Ai	7.7
599	262	230	135	155	1.14	0.59	1.13	0.59	4Ai	6.2
65	284	233	136	180	1.22	0.58	1.07	0.63	4Ai	7.3
465	260	225	145	180	1.16	0.64	1.00	0.69	4Ai	7.1
237	274	231	133	180	1.19	0.58	0.96	0.66	4Ai	6.5
487	246	211	110	152	1.17	0.52	0.93	0.62	4Ai	5.5
690	260	237	145	152	1.10	0.61	1.17	0.58	4Ai	6.3
Mean	267.50	231.63	138.00	165.63	**1.16**	**0.59**	**1.09**	**0.62**		**6.74**
Min	246.00	211.00	110.00	152.00	1.10	0.52	0.93	0.58		5.50
Max	284.00	245.00	160.00	180.00	1.22	0.66	1.41	0.69		7.70
Std Dev	11.99	9.81	13.27	12.08	**0.03**	**0.04**	**0.14**	**0.04**		**0.69**

4Aii

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
141	222	206	115	141	1.08	0.56	0.89	0.64	4Aii	3.3
69	216	194	116	130	1.11	0.60	1.10	0.60	4Aii	3.6
113	218	187	110	151	1.17	0.59	0.87	0.69	4Aii	3.3
192	248	210	110	142	1.18	0.52	1.06	0.57	4Aii	5.9
194	230	195	107	133	1.18	0.55	1.10	0.58	4Aii	4.1
258	230	205	110	150	1.12	0.54	0.84	0.65	4Aii	4.6
284	240	190	98	148	1.26	0.52	1.00	0.62	4Aii	4.1
294	222	203	120	160	1.09	0.59	0.75	0.72	4Aii	4.3
325	222	208	100	156	1.07	0.48	0.61	0.70	4Aii	4.5
331	240	215	140	163	1.12	0.65	1.03	0.68	4Aii	5.1
351	224	191	122	136	1.17	0.64	1.28	0.61	4Aii	3.8
388	240	207	125	156	1.16	0.60	1.02	0.65	4Aii	5.1
519	234	209	125	146	1.12	0.60	1.05	0.62	4Aii	4.6
622	234	210	113	144	1.11	0.54	0.93	0.62	4Aii	4.5
654	222	200	113	140	1.11	0.57	0.94	0.63	4Aii	4.2
705	248	220	130	150	1.13	0.59	1.09	0.60	4Aii	5.7
707	240	214	110	142	1.12	0.51	0.94	0.59	4Aii	4.6
762	240	208	120	162	1.15	0.58	0.89	0.68	4Aii	5.4
856	220	195	110	157	1.13	0.56	0.74	0.71	4Aii	4.3
873	230	205	100	130	1.12	0.49	0.95	0.57	4Aii	4.1
961	236	201	110	156	1.17	0.55	0.88	0.66	4Aii	4.3
990	218	189	100	170	1.15	0.53	0.54	0.78	4Aii	4
953	246	213	120	138	1.15	0.56	1.16	0.56	4Aii	4.8
1027	222	199	118	152	1.12	0.59	0.86	0.68	4Aii	4
Mean	230.92	203.08	114.25	148.04	**1.14**	**0.56**	**0.94**	**0.64**		**4.43**
Min	216.00	187.00	98.00	130.00	1.07	0.48	0.54	0.56		3.30
Max	248.00	220.00	140.00	170.00	1.26	0.65	1.28	0.78		5.90
Std Dev	9.98	8.84	9.91	10.56	**0.04**	**0.04**	**0.17**	**0.05**		**0.65**

4Aiii

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
73	210	177	100	136	1.19	0.56	0.96	0.65	4Aiii	3
257	186	175	90	140	1.06	0.51	0.54	0.75	4Aiii	2.5
464	218	180	95	140	1.21	0.53	0.92	0.64	4Aiii	3.9
575	222	198	100	151	1.12	0.51	0.72	0.68	4Biii	4.3
632	220	194	95	136	1.13	0.49	0.85	0.62	4Aiii	3.5
785	240	193	110	146	1.24	0.57	1.13	0.61	4Aiii	4.1
796	204	184	97	136	1.11	0.53	0.78	0.67	4Aiii	3
402	216	174	110	134	1.24	0.63	1.28	0.62	4Aiii	3.5
1059	220	172	88	138	1.28	0.51	0.98	0.63	4Aiii	3.3
1058	182	163	95	108	1.12	0.58	1.09	0.59	4Aiii	1.9
1005	216	178	105	138	1.21	0.59	1.07	0.64	4Aiii	3.2
Mean	212.18	180.73	98.64	136.64	**1.17**	**0.55**	**0.94**	**0.65**		**3.29**
Min	182.00	163.00	88.00	108.00	1.06	0.49	0.54	0.59		1.90
Max	240.00	198.00	110.00	151.00	1.28	0.63	1.28	0.75		4.30
Std Dev	15.74	10.12	6.96	10.22	**0.07**	**0.04**	**0.20**	**0.04**		**0.67**

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
82	152	133	75	100	1.14	0.56	0.90	0.66	4Aiv	1.2
72	158	140	72	100	1.13	0.51	0.85	0.63	4Aiv	1.02
244	136	125	65	98	1.09	0.52	0.63	0.72	4Aiv	0.8
251	156	134	70	128	1.16	0.52	0.44	0.82	4Aiv	1.4
403	150	131	76	91	1.15	0.58	1.07	0.61	4Aiv	1.04
489	160	138	85	99	1.16	0.62	1.15	0.62	4Aiv	1.4
760	180	150	95	126	1.20	0.63	0.98	0.70	4Aiv	1.8
941	158	131	75	101	1.21	0.57	1.02	0.64	4Aiv	1.2
188	200	174	85	128	1.15	0.49	0.81	0.64	4Aiv	
199	184	160	85	122	1.15	0.53	0.83	0.66	4Aiv	
193	178	164	70	130	1.09	0.43	0.51	0.73	4Aiv	
1094	168	132	73	100	1.27	0.55	1.15	0.60	4Aiv	1.2
813	150	118	57	102	1.27	0.48	0.79	0.68	4Aiv	1
Mean	163.85	140.77	75.62	109.62	**1.17**	**0.54**	**0.86**	**0.67**		**1.21**
Min	136.00	118.00	57.00	91.00	1.09	0.43	0.44	0.60		0.80
Max	200.00	174.00	95.00	130.00	1.27	0.63	1.15	0.82		1.80
Std Dev	16.72	15.81	9.54	13.91	**0.06**	**0.05**	**0.22**	**0.06**		**0.26**

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
228	215	183	110	182	1.17	0.60	0.45	0.85	4Biii	3.8
296	212	185	100	166	1.15	0.54	0.54	0.78	4Biii	4.1
349	200	180	94	162	1.11	0.52	0.44	0.81	4Biii	3.6
400	204	160	105	160	1.28	0.66	0.80	0.78	4Biii	2.7
452	210	183	100	160	1.15	0.55	0.60	0.76	4Biii	3.8
463	202	172	95	160	1.17	0.55	0.55	0.79	4Biii	3.4
Mean	207.17	177.17	100.67	165.00	**1.17**	**0.57**	**0.56**	**0.80**		**3.57**
Min	200.00	160.00	94.00	160.00	1.11	0.52	0.44	0.76		2.70
Max	215.00	185.00	110.00	182.00	1.28	0.66	0.80	0.85		4.10
Std Dev	5.49	8.74	5.53	7.90	**0.05**	**0.05**	**0.12**	**0.03**		**0.44**

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volume
412	200	163	100	146	1.23	0.61	0.86	0.73	4Biv	2.6
744	182	162	80	136	1.12	0.49	0.56	0.75	4Biv	2.2
Mean	191.00	162.50	90.00	141.00	**1.18**	**0.55**	**0.71**	**0.74**		2.4
Min	182.00	162.00	80.00	136.00	1.12	0.49	0.56	0.73		2.2
Max	200.00	163.00	100.00	146.00	1.23	0.61	0.86	0.75		2.6
Std Dev	9.00	0.50	10.00	5.00	**0.05**	**0.06**	**0.15**	**0.01**		0.2

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volume
101	280	295	145	156	0.95	0.49	0.83	0.56	5Ai	10.3
77	264	272	110	174	0.97	0.40	0.56	0.66	5Ai	8.5
210	268	255	160	160	1.05	0.63	1.14	0.60	5Ai	7.9
213	310	310	180	188	1.00	0.58	0.94	0.61	5Ai	12
425	274	270	180	173	1.01	0.67	1.12	0.63	5Ai	9.4
954	262	273	150	164	0.96	0.55	0.80	0.63	5Ai	7.1
Mean	276.33	279.17	154.17	169.17	**0.99**	**0.55**	**0.90**	**0.61**		9.2
Min	262.00	255.00	110.00	156.00	0.95	0.40	0.56	0.56		7.1
Max	310.00	310.00	180.00	188.00	1.05	0.67	1.14	0.66		12
Std Dev	16.22	18.07	23.88	10.62	**0.04**	**0.09**	**0.20**	**0.03**		1.616580754

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
119	250	273	178	182	0.92	0.65	0.72	0.73	5Bi	6.4
153	240	235	125	143	1.02	0.53	0.88	0.60	5Bi	5.3
198	250	235	125	150	1.06	0.53	0.91	0.60	5Bi	5.7
202	220	225	110	152	0.98	0.49	0.59	0.69	5Bi	4.7
232	204	215	155	162	0.95	0.72	0.70	0.79	5Bi	4
239	248	235	120	188	1.06	0.51	0.52	0.76	5Bi	6
259	224	240	100	150	0.93	0.42	0.53	0.67	5Bi	4.2
273	230	232	125	174	0.99	0.54	0.52	0.76	5Bi	5
322	240	235	144	168	1.02	0.61	0.79	0.70	5Bi	6.5
429	204	215	105	142	0.95	0.49	0.56	0.70	5Bi	
173	234	222	118	164	1.05	0.53	0.67	0.70	5Bi	4.7
1095	260	240	80	174	1.08	0.33	0.54	0.67	5Bi	6
Mean	233.67	233.50	123.75	162.42	**1.00**	**0.53**	**0.66**	**0.70**		**5.32**
Min	204.00	215.00	80.00	142.00	0.92	0.33	0.52	0.60		4.00
Max	260.00	273.00	178.00	188.00	1.08	0.72	0.91	0.79		6.50
Std Dev	17.24	14.56	24.83	14.58	**0.05**	**0.10**	**0.13**	**0.06**		**0.83**

5Bii

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volume
236	190	202	117	138	0.94	0.58	0.61	0.73	5Bii	2.5

Mean	190.00	202.00	117.00	138.00	**0.94**	**0.58**	**0.61**	**0.73**		**2.50**
Min	190.00	202.00	117.00	138.00	0.94	0.58	0.61	0.73		2.50
Max	190.00	202.00	117.00	138.00	0.94	0.58	0.61	0.73		2.50
Std Dev	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**	**0.00**		**0.00**

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volume
57	144	139	80	120	1.04	0.58	0.41	0.83	5Biii	1.03
29	120	115	65	110	1.04	0.57	0.20	0.92	5Biii	0.55
169	152	153	88	122	0.99	0.58	0.46	0.80	5Biii	1.5
877	143	127	65	107	1.13	0.51	0.58	0.75	5Biii	1.1
340	168	164	90	110	1.02	0.55	0.78	0.65	5Biii	1.8
382	142	129	75	110	1.10	0.58	0.59	0.77	5Biii	1.03
390	126	116	65	100	1.09	0.56	0.51	0.79	5Biii	0.7
1015	166	145	80	104	1.14	0.55	0.95	0.63	5Biii	1.4
484	146	141	80	90	1.04	0.57	0.92	0.62	5Biii	1
692	160	166	95	108	0.96	0.57	0.73	0.68	5Biii	1.7

Mean	146.70	139.50	78.30	108.10	**1.06**	**0.56**	**0.61**	**0.74**		**1.18**
Min	120.00	115.00	65.00	90.00	0.96	0.51	0.20	0.62		0.55
Max	168.00	166.00	95.00	122.00	1.14	0.58	0.95	0.92		1.80
Std Dev	14.89	17.14	10.30	8.70	**0.05**	**0.02**	**0.22**	**0.09**		**0.39**

6A

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
145	282	232	140	164	1.22	0.60	1.28	0.58	6	7.7
219	284	210	110	156	1.35	0.52	1.28	0.55	6	7.9
532	288	240	105	163	1.20	0.44	0.93	0.57	6	8.3
565	300	239	130	160	1.26	0.54	1.28	0.53	6	8.7
583	290	255	145	174	1.14	0.57	1.05	0.60	6	8.7
639	322	249	130	178	1.29	0.52	1.21	0.55	6	11
759	282	196	80	160	1.44	0.41	1.05	0.57	6	6.2
777	270	197	100	146	1.37	0.51	1.28	0.54	6	6.1
793	297	232	130	161	1.28	0.56	1.33	0.54	6	8.7
1136	303	216	80	164	1.40	0.37	1.02	0.54	6	8.3
Mean	291.80	226.60	115.00	162.60	**1.29**	**0.50**	**1.17**	**0.56**		**8.16**
Min	270.00	196.00	80.00	146.00	1.14	0.37	0.93	0.53		6.10
Max	322.00	255.00	145.00	178.00	1.44	0.60	1.33	0.60		11.00
Std Dev	13.70	19.75	22.36	8.40	**0.09**	**0.07**	**0.14**	**0.02**		**1.32**

Miniatures

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
4	160	112	65	132	1.43	0.58	0.60	0.83	Min	1.3
29	120	115	65	110	1.04	0.57	0.20	0.92	Min	0.55
57	144	139	80	120	1.04	0.58	0.41	0.83	Min	1.03
72	158	140	72	100	1.13	0.51	0.85	0.63	Min	1.02
82	152	133	75	100	1.14	0.56	0.90	0.66	Min	1.2
90	160	128	65	100	1.25	0.51	0.95	0.63	Min	1.02
121	175	135	77	105	1.30	0.57	1.21	0.60	Min	1.5
123	190	133	75	135	1.43	0.56	0.95	0.71	Min	1.7
124	160	125	70	106	1.28	0.56	0.98	0.66	Min	1.03
169	152	153	88	122	0.99	0.58	0.46	0.80	Min	1.5
183	170	143	65	101	1.19	0.45	0.88	0.59	Min	1.4
244	136	125	65	98	1.09	0.52	0.63	0.72	Min	0.8
251	156	134	70	128	1.16	0.52	0.44	0.82	Min	1.4
304	158	122	63	115	1.30	0.52	0.73	0.73	Min	1.1
358	172	130	65	132	1.32	0.50	0.62	0.77	Min	1.6
382	142	129	75	110	1.10	0.58	0.59	0.77	Min	
390	126	116	65	100	1.09	0.56	0.51	0.79	Min	0.7
397	182	142	85	124	1.28	0.60	1.02	0.68	Min	1.8
403	150	131	76	91	1.15	0.58	1.07	0.61	Min	1.04
412	200	163	100	146	1.23	0.61	0.86	0.73	Min	2.6
431	145	109	56	110	1.33	0.51	0.66	0.76	Min	0.9
470	176	128	70	60	1.38	0.55	2.00	0.63	Min	1.3
484	146	141	80	90	1.04	0.57	0.92	0.62	Min	1
489	160	138	85	99	1.16	0.62	1.15	0.62	Min	1.4
528	150	150	55	90	1.00	0.37	0.63	0.60	Min	1.3
590	180	140	70	122	1.29	0.50	0.83	0.68	Min	1.8
616	175	135	70	137	1.30	0.52	0.58	0.78	Min	1.7
692	160	166	95	108	0.96	0.57	0.73	0.68	Min	1.7
744	182	162	80	136	1.12	0.49	0.56	0.75	Min	2.2
760	180	150	95	126	1.20	0.63	0.98	0.70	Min	1.8
789	185	148	70	112	1.25	0.47	0.94	0.61	Min	1.7
813	150	118	57	102	1.27	0.48	0.79	0.68	Min	1

Miniatures

854	176	135	60	126	1.30	0.44	0.67	0.72	Min	1.5
877	143	127	65	107	1.13	0.51	0.58	0.75	Min	1.1
941	158	131	75	101	1.21	0.57	1.02	0.64	Min	1.2
943	160	120	65	120	1.33	0.54	0.73	0.75	Min	1.1
1015	166	145	80	104	1.14	0.55	0.95	0.63	Min	1.4
1058	182	163	95	108	1.12	0.58	1.09	0.59	Min	1.9
1094	168	132	73	100	1.27	0.55	1.15	0.60	Min	1.2
1185	182	146	65	145	1.25	0.45	0.46	0.80	Min	2.2
Mean	162.18	135.80	73.05	111.95	**1.20**	**0.54**	**0.81**	**0.70**		**1.38**
Min	120.00	109.00	55.00	60.00	0.96	0.37	0.20	0.59		0.55
Max	200.00	166.00	100.00	146.00	1.43	0.63	2.00	0.92		2.60
Std Dev	17.36	13.91	10.91	17.07	**0.12**	**0.05**	**0.30**	**0.08**		**0.43**

Ungrouped

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Suggested Group	Volumes
27	202	161	82	126	1.25	0.51	0.96	0.62	4Aiii	2.6
186	194	168	85	130	1.15	0.51	0.77	0.67	4Aiii	2.5
188	200	174	85	128	1.15	0.49	0.81	0.64	4Aiii	2.5
193	178	164	70	130	1.09	0.43	0.51	0.73	4Aiii	2
199	184	160	85	122	1.15	0.53	0.83	0.66	4Aiii	2.2
288	258	233	140	152	1.11	0.60	1.14	0.59	1Ai	6.5
292	164	254	100	106	0.65	0.39	0.38	0.65	?	3.3
313	220	172	115	180	1.28	0.67	0.70	0.82	3Bii	3.9
323	284	200	75	184	1.42	0.38	0.80	0.65	6A	6.9
340	168	164	90	110	1.02	0.55	0.78	0.65	5Bii	1.8
355	362	260	150	202	1.39	0.58	1.45	0.56	6A	12
375	202	185	86	126	1.09	0.46	0.77	0.62	4Aiii	3.3
385	190	163	100	154	1.17	0.61	0.57	0.81	4Biv	2.5
416	230	219	110	206	1.05	0.50	0.22	0.90	4Ai/5Ai	6.1
552	246	150	85	220	1.64	0.57	0.40	0.89	2Aii	4.3
663	190	171	95	98	1.11	0.56	1.21	0.52	1Biii	1.9
679	304	190	90	182	1.60	0.47	1.22	0.60	6A	8.1
697	202	270	120	100	0.75	0.44	0.68	0.50	?	4.3
702	275	272	150	144	1.01	0.55	1.07	0.52	1Ai	8.8
708	240	276	150	125	0.87	0.54	0.91	0.52	1Ai	6.3
782	180	175	80	136	1.03	0.46	0.46	0.76	4Aiii	2.1
862	251	208	140	202	1.21	0.67	0.72	0.80	4Bi	5.3
886	280	253	155	210	1.11	0.61	0.71	0.75	5Ai	9.4
915	175	168	85	102	1.04	0.51	0.88	0.58	1Aiii/1Biii	1.7
1093	240	185	100	152	1.30	0.54	1.04	0.63	3Bii	4.5
709	200	194	75	86	1.03	0.39	0.96	0.43	?	2.5
346	192	195	105	80	0.98	0.54	1.24	0.42	1Aiii	2.4
269	216	205	102	100	1.05	0.50	1.13	0.46	1Aii	3.6
579	200	230	110	100	0.87	0.48	0.83	0.50	?	3.5
289	196	195	90	100	1.01	0.46	0.91	0.51	1Aii/1Aiii	2.5
868	200	220	100	90	0.91	0.45	0.92	0.45	1Aii	2.6
919	198	233	110	70	0.85	0.47	1.04	0.35	?	3.4

Urn Number	Max Diam	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
EL75AF	269	229	124	119	1.18	0.54	1.42	0.44	1Ai	6.5
EL75CW	254	229	125	111	1.11	0.55	1.37	0.44	1Ai	5.4
EL75KG	263	250	136	111	1.05	0.54	1.33	0.42	1Ai	6
EL75KW	229	240	117	100	0.95	0.49	1.04	0.44	1Ai	4.5
EL76CR	271	236	128	128	1.15	0.54	1.32	0.47	1Ai	7.1
EL76DM	244	240	136	122	1.02	0.57	1.17	0.50	1Ai	5.8
EL76IL	244	224	122	118	1.09	0.55	1.25	0.48	1Ai	5.1
EL76MZ	256	228	115	119	1.12	0.51	1.21	0.47	1Ai	5.9
EL76PQ	278	267	142	100	1.04	0.53	1.42	0.36	1Ai	5.9
EL76PB	268	269	133	104	0.99	0.49	1.20	0.39	1Ai	7.4
EL76DF	243	233	121	132	1.04	0.52	0.99	0.54	1Ai	5.5
EL75KA	261	246	126	111	1.06	0.51	1.26	0.43	1Ai	7
EL75IQ	283	243	125	125	1.17	0.51	1.34	0.44	1Ai	8
EL76AD	278	236	103	139	1.18	0.44	1.04	0.50	1Ai	7
EL76AVa	275	251	122	114	1.09	0.49	1.25	0.41	1Ai	6.7
EL76JR	306	269	132	139	1.13	0.49	1.21	0.45	1Ai	9.2
EL76LOa	276	247	107	114	1.12	0.43	1.16	0.41	1Ai	7.8
	247	229	104	136	1.08	0.45	0.89	0.55	1Ai	6
EL76CO	271	268	142	119	1.01	0.53	1.20	0.44	1Ai	7.6
EL75LW	285	292	181	114	0.98	0.62	1.54	0.40	1Ai	8.9
Mean	265	246	127	119	**1.08**	**0.51**	**1.23**	**0.45**		**6.67**
Min	229	224	103	100	0.95	0.43	0.89	0.36		4.50
Max	306	292	181	139	1.18	0.62	1.54	0.55		9.20
Std Dev	18	18	16	11	**0.06**	**0.04**	**0.15**	**0.05**		**1.21**

Urn Number	Max Diam	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
EL75FM	236	231	113	133	1.02	0.49	0.87	0.56	1Aii	5
EL75GX	246	231	100	128	1.07	0.43	0.90	0.52	1Aii	5
EL75IO	244	221	128	131	1.11	0.58	1.22	0.53	1Aii	5.2
EL75LU	254	226	115	121	1.12	0.51	1.20	0.48	1Aii	5.6
EL75OS	233	225	108	117	1.04	0.48	1.00	0.50	1Aii	5
EL75QG	244	233	113	132	1.05	0.48	0.93	0.54	1Aii	4.7
EL75HG	235	208	128	114	1.13	0.61	1.50	0.49	1Aii	4.7
EL75KH	242	222	111	119	1.09	0.50	1.10	0.49	1Aii	4.3
EL75LH	228	206	111	114	1.11	0.54	1.21	0.50	1Aii	4
EL76BJ	225	211	111	106	1.07	0.53	1.19	0.47	1Aii	3.8
EL76CJ	219	213	104	126	1.03	0.49	0.86	0.58	1Aii	4.1
EL76JF	222	211	106	122	1.05	0.50	0.95	0.55	1Aii	4.3
EL76NEa	217	208	107	115	1.04	0.51	1.00	0.53	1Aii	3.5
EL75PN	196	192	89	101	1.02	0.46	0.92	0.52	1Aii	2.7
EL76IA	208	196	125	100	1.06	0.64	1.53	0.48	1Aii	3.7
EL75KWa	228	240	118	100	0.95	0.49	1.05	0.44	1Aii	4.5
EL76NV	229	217	124	97	1.06	0.57	1.42	0.42	1Aii	3.8
Mean	230	217	112	116	**1.06**	**0.52**	**1.11**	**0.51**		**4.35**
Min	196	192	89	97	0.95	0.43	0.86	0.42		2.70
Max	254	240	128	133	1.13	0.64	1.53	0.58		5.60
Std Dev	14	13	10	12	**0.04**	**0.05**	**0.21**	**0.04**		**0.71**

Urn Number	Max Diam	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
EL75DZ	160	147	78	75	1.08	0.53	1.22	0.47	1Aiii	1.2
EL75IH	167	153	74	85	1.09	0.48	1.04	0.51	1Aiii	1.2
EL75OV	154	142	61	96	1.09	0.43	0.72	0.62	1Aiii	1.1
E75GJ	167	147	63	85	1.13	0.42	0.97	0.51	1Aiii	1.2
Mean	162	147	69	85	**1.10**	**0.47**	**0.99**	**0.53**		**1.18**
Min	154	142	61	75	1.08	0.42	0.72	0.47		1.10
Max	167	153	78	96	1.13	0.53	1.22	0.62		1.20
Std Dev	5	4	7	7	**0.02**	**0.04**	**0.18**	**0.06**		**0.04**

Urn Number	Max Diam	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
EL75IV	261	210	118	118	1.25	0.56	1.56	0.45	1Bi	5.54
EL75QV	275	210	96	136	1.31	0.46	1.22	0.49	1Bi	5.4
EL76IV	240	206	81	114	1.17	0.39	1.01	0.47	1Bi	5.4
EL76NN	258	211	111	125	1.22	0.53	1.33	0.48	1Bi	5.2
EL75KQ	247	219	111	135	1.13	0.51	1.04	0.54	1Bi	5.4
Mean	256	211	103	126	**1.22**	**0.49**	**1.23**	**0.49**		**5.39**
Min	240	206	81	114	1.13	0.39	1.01	0.45		5.20
	275	219	118	136	1.31	0.56	1.56	0.54		5.54
Std Dev	12	5	14	9	**0.06**	**0.06**	**0.20**	**0.03**		**0.11**

Urn Number	Max Diam	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
EL75GP	222	161	89	126	1.38	0.55	1.33	0.57	1Bii	2.9
EL75IC	231	194	113	125	1.19	0.58	1.29	0.54	1Bii	4
EL75QH	219	181	76	118	1.22	0.42	0.97	0.54	1Bii	3.7
EL76CS	251	181	90	117	1.39	0.50	1.49	0.46	1Bii	4.3
EL75OQ	226	200	94	106	1.13	0.47	1.14	0.47	1Bii	3.8
EL75PO	257	182	92	100	1.41	0.50	1.74	0.39	1Bii	4.2

	234	183	92	115	**1.29**	**0.50**	**1.33**	**0.49**		**3.82**
Min	219	161	76	100	1.13	0.42	0.97	0.39		2.90
Max	257	200	113	126	1.41	0.58	1.74	0.57		4.30
Std Dev	14	12	11	10	**0.11**	**0.05**	**0.24**	**0.06**		**0.46**

Urn Number	Max Diam	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
EL76CP	172	136	76	86	1.27	0.56	1.44	0.50	1Biii	1.7

	172	136	76	86	**1.27**	**0.56**	**1.44**	**0.50**	**1.70**
Min	172	136	76	86	1.27	0.56	1.44	0.50	1.70
Max	172	136	76	86	1.27	0.56	1.44	0.50	1.70
Std Dev	0	0	0	0	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Urn Number	Max Diam	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
EL75DM	218	233	106	110	0.93	0.45	0.85	0.50	1Di	4.2
EL75IM	233	215	96	119	1.08	0.45	0.95	0.51	1Di	4.4
EL75LB	226	244	111	117	0.93	0.45	0.82	0.52	1Di	4.7
EL75PG	224	236	119	110	0.95	0.51	0.98	0.49	1Di	4.6
EL75QZ	215	240	114	111	0.90	0.47	0.82	0.52	1Di	4.5
EL75RB	214	244	108	107	0.88	0.44	0.79	0.50	1Di	4.5
EL76HO	196	221	115	100	0.89	0.52	0.91	0.51	1Di	3.6
EL76PV	194	215	104	97	0.90	0.48	0.88	0.50	1Di	3.2
EL76PY	197	219	110	108	0.90	0.50	0.81	0.55	1Di	3.2
EL75HD	215	219	101	107	0.98	0.46	0.92	0.50	1Di	3.9
EL75OR	222	231	126	115	0.96	0.55	1.03	0.52	1Di	4.1
EL75PC	225	229	142	125	0.98	0.62	1.14	0.56	1Di	4.9
EL75FG	229	233	126	125	0.98	0.54	0.97	0.55	1Di	4.8
EL76DH	219	222	108	136	0.99	0.49	0.73	0.62	1Di	4.1
EL76KU	236	217	103	139	1.09	0.47	0.85	0.59	1Di	4.5
EL75PHb	217	225	142	118	0.96	0.63	1.18	0.54	1Di	4.6
EL76KA	217	254	132	125	0.85	0.52	0.75	0.58	1Di	5.3
Mean	218	229	116	116	**0.95**	**0.50**	**0.90**	**0.53**		**4.30**
Min	194	215	96	97	0.85	0.44	0.73	0.49		3.20
Max	236	254	142	139	1.09	0.63	1.18	0.62		5.30
Std Dev	12	11	13	11	**0.06**	**0.05**	**0.12**	**0.04**		**0.56**

Urn Number	Max Diam	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
EL75FH	214	210	101	104	1.02	0.48	1.01	0.49	1Dii	3.2
EL75HI	194	196	90	118	0.99	0.46	0.72	0.61	1Dii	2.6
EL75HU	188	186	94	92	1.01	0.51	1.05	0.49	1Dii	2.4
EL75OA	194	194	99	103	1.00	0.51	0.96	0.53	1Dii	2.8
EL75PT	188	196	103	100	0.96	0.52	0.94	0.53	1Dii	2.6
EL75OK	208	204	124	114	1.02	0.61	1.17	0.55	1Dii	3.8
EL76ITb	197	189	104	89	1.04	0.55	1.28	0.45	1Dii	2.5
EL75GU	217	201	117	125	1.08	0.58	1.08	0.58	1Dii	3.4
EL75KZ	210	201	110	115	1.04	0.54	1.03	0.55	1Dii	3.4
EL76CQ	196	200	111	125	0.98	0.56	0.80	0.64	1Dii	2.8
EL75NT	211	193	83	124	1.09	0.43	0.80	0.59	1Dii	3.4
	202	197	103	110	**1.02**	**0.52**	**0.99**	**0.54**		**2.99**
Min	188	186	83	89	0.96	0.43	0.72	0.45		2.40
Max	217	210	124	125	1.09	0.61	1.28	0.64		3.80
Std Dev	10	7	11	12	**0.04**	**0.05**	**0.16**	**0.05**		**0.44**

Urn Number	Max Diam	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
EL76KE	167	160	78	94	1.04	0.49	0.88	0.57	1Diii	1.9
EL76MPb	178	161	83	106	1.10	0.52	0.93	0.59	1Diii	2.1
EL75NC	175	171	76	100	1.02	0.45	0.79	0.57	1Diii	2

	173	164	79	100	**1.06**	**0.48**	**0.87**	**0.58**	**2.00**
Min	167	160	76	94	1.02	0.45	0.79	0.57	1.90
Max	178	171	83	106	1.10	0.52	0.93	0.59	2.10
Std Dev	5	5	3	5	**0.03**	**0.03**	**0.06**	**0.01**	**0.08**

Urn Number	Max Diam	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
EL75CT	265	194	111	171	1.36	0.57	1.13	0.64	2Ai	6.5
EL75MI	258	201	103	160	1.28	0.51	1.00	0.62	2Ai	5.5
EL76LJ	290	206	108	206	1.41	0.53	0.87	0.71	2Ai	7.8
EL76NJ	264	183	106	172	1.44	0.58	1.18	0.65	2Ai	5.4
	269	196	107	177	**1.37**	**0.55**	**1.05**	**0.66**		**6.30**
Min	258	183	103	160	1.28	0.51	0.87	0.62		5.40
Max	290	206	111	206	1.44	0.58	1.18	0.71		7.80
Std Dev	12	8	3	17	**0.06**	**0.03**	**0.12**	**0.03**		**0.97**

2Aii

Urn Number	Max Diam	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
EL75GR	264	181	103	192	1.46	0.57	0.93	0.73	2Aii	5.1
EL75RG	236	156	76	174	1.52	0.49	0.79	0.74	2Aii	3.4
EL76NF	244	167	78	194	1.47	0.47	0.56	0.80	2Aii	5
EL76BTd	250	181	97	201	1.38	0.54	0.58	0.81	2Aii	5.5
Mean	249	171	89	190	**1.46**	**0.52**	**0.72**	**0.77**		**4.75**
	236	156	76	174	1.38	0.47	0.56	0.73		3.40
Max	264	181	103	201	1.52	0.57	0.93	0.81		5.50
Std Dev	10	10	12	10	**0.05**	**0.04**	**0.15**	**0.04**		**0.80**

2Aiii

Urn Number	Max Diam	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
EL75DJb	194	146	83	118	1.33	0.57	1.22	0.61	2Aiii	2.3
EL76NA	197	144	85	111	1.37	0.59	1.44	0.56	2Aiii	2
	196	145	84	115	**1.35**	**0.58**	**1.33**	**0.59**		**2.15**
Min	194	144	83	111	1.33	0.57	1.22	0.56		2.00
Max	197	146	85	118	1.37	0.59	1.44	0.61		2.30
Std Dev	1	1	1	3	**0.02**	**0.01**	**0.11**	**0.02**		**0.15**

Urn Number	Max Diam	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
EL75QM	260	222	111	197	1.17	0.50	0.56	0.76	3Ai	7.2
EL76BTa	292	238	135	183	1.23	0.57	1.05	0.63	3Ai	8.7
EL76DA	285	219	114	185	1.30	0.52	0.95	0.65	3Ai	7.8
EL76JNa	264	224	129	194	1.18	0.58	0.74	0.74	3Ai	7.1

	275	226	122	190	**1.22**	**0.54**	**0.82**	**0.69**		**7.70**
Min	260	219	111	183	1.17	0.50	0.56	0.63		7.10
Max	292	238	135	197	1.30	0.58	1.05	0.76		8.70
Std Dev	14	7	10	6	**0.05**	**0.03**	**0.19**	**0.06**		**0.64**

Urn Number	Max Diam	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
EL75DN	242	188	115	208	1.29	0.61	0.46	0.86	3Bi	5.6
EL75OJ	236	182	88	196	1.30	0.48	0.43	0.83	3Bi	5.3
EL75PH	251	200	100	194	1.26	0.50	0.57	0.77	3Bi	5.7
EL75RQ	233	204	100	167	1.14	0.49	0.64	0.71	3Bi	5.1
EL75CE	242	199	103	144	1.22	0.52	1.01	0.60	3Bi	5.2
Mean	241	194	101	182	**1.24**	**0.52**	**0.62**	**0.76**		**5.38**
Min	233	182	88	144	1.14	0.48	0.43	0.60		5.10
	251	204	115	208	1.30	0.61	1.01	0.86		5.70
Std Dev	6	8	9	23	**0.06**	**0.05**	**0.21**	**0.09**		**0.23**

Urn Number	Max Diam	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
EL75BBa	194	143	75	139	1.36	0.52	0.82	0.71	3Bii	2.4
EL76GH	217	169	89	158	1.28	0.52	0.72	0.73	3Bii	3.5
EL75CN	215	168	92	139	1.28	0.55	1.00	0.65	3Bii	3.2
EL76CL	233	182	92	153	1.28	0.50	0.89	0.65	3Bii	4
EL76GH	217	169	89	158	1.28	0.52	0.72	0.73	3Bii	3.5

Mean	215	166	87	149	**1.30**	**0.52**	**0.83**	**0.70**		**3.32**
	194	143	75	139	1.28	0.50	0.72	0.65		2.40
Max	233	182	92	158	1.36	0.55	1.00	0.73		4.00
Std Dev	12	13	6	9	**0.03**	**0.01**	**0.11**	**0.04**		**0.53**

Urn Number	Max Diam	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
EL76ED	178	136	71	121	1.31	0.52	0.87	0.68	3Biii	1.5
	178	136	71	121	1.31	0.52	0.87	0.68		**1.50**
Min	178	136	71	121	1.31	0.52	0.87	0.68		1.50
Max	178	136	71	121	1.31	0.52	0.87	0.68		1.50
Std Dev	0	0	0	0	0.00	0.00	0.00	0.00		**0.00**

Urn Number	Max Diam	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
EL75EG	254	243	126	161	1.05	0.52	0.80	0.63	4Ai	6.1
EL76CU	294	258	151	172	1.14	0.59	1.14	0.58	4Ai	10.2
EL76KB	286	261	119	188	1.10	0.46	0.70	0.66	4Ai	9.4
EL75MQ	278	246	136	172	1.13			0.62	4Ai	7.5
EL75NZ	283	256	139	160	1.11	0.54	1.06	0.56	4Ai	7.4
	279	253	134	171	**1.10**	**0.53**	**0.92**	**0.61**		**8.12**
Min	254	243	119	160	1.05	0.46	0.70	0.56		6.10
Max	294	261	151	188	1.14	0.59	1.14	0.66		10.20
Std Dev	14	7	11	10	**0.03**	**0.05**	**0.18**	**0.03**		**1.48**

4Aii

Urn Number	Max Diam	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
EL75IZ	214	192	118	160	1.12	0.62	0.74	0.75	4Aii	3.9
EL75JS	219	215	115	146	1.02	0.54	0.74	0.66	4Aii	5.1
EL75QI	222	214	117	139	1.04	0.55	0.86	0.63	4Aii	4.7
EL75HY	233	201	101	153	1.16	0.50	0.81	0.65	4Aii	4.2
EL75PMb	210	178	81	146	1.18	0.45	0.66	0.70	4Aii	3.3
EL75PV	215	188	97	144	1.15	0.52	0.78	0.67	4Aii	3.3
EL75CC	236	194	117	163	1.21	0.60	0.95	0.69	4Aii	5.1
EL75HW	242	204	108	171	1.18	0.53	0.74	0.71	4Aii	5.2
	224	198	107	153	**1.13**	**0.54**	**0.78**	**0.68**		**4.35**
Min	210	178	81	139	1.02	0.45	0.66	0.63		3.30
Max	242	215	118	171	1.21	0.62	0.95	0.75		5.20
Std Dev	11	12	12	10	**0.07**	**0.05**	**0.08**	**0.03**		**0.74**

4Aiii

Urn Number	Max Diam	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
EL75HO	194	167	97	118	1.17	0.58	1.10	0.61	4Aiii	2.6
EL75JF	190	178	101	118	1.07	0.57	0.95	0.62	4Aiii	2.4
EL75NY	188	179	101	122	1.05	0.57	0.84	0.65	4Aiii	2.5
EL76DR	181	167	85	114	1.08	0.51	0.81	0.63	4Aiii	2.3
EL76JH	178	161	97	108	1.10	0.60	1.09	0.61	4Aiii	2
EL75QR	207	178	90	139	1.16	0.51	0.78	0.67	4Aiii	3.2
El75NX	182	169	92	117	1.07	0.54	0.84	0.64	4Aiii	2.3
EL76AT	178	143	75	118	1.24	0.52	0.88	0.66	4Aiii	1.8
EL76MY	168	142	71	129	1.19			0.77	4Aiii	1.9
EL75OX	188	154	65	125	1.22	0.42	0.70	0.67	4Aiii	2.3
EL76IE	188	157	83	108	1.19	0.53	1.08	0.58	4Aiii	2.3
	185	163	87	120	**1.14**	**0.54**	**0.91**	**0.65**		**2.33**
Min	168	142	65	108	1.05	0.42	0.70	0.58		1.80
Max	207	179	101	139	1.24	0.60	1.10	0.77		3.20
Std Dev	10	13	12	9	**0.06**	**0.05**	**0.13**	**0.05**		**0.36**

Urn Number	Max Diam	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
EL75CH	143	118	47	108	1.21	0.40	0.49	0.76	4Aiv	0.9
EL76BL	153	118	58	125	1.29	0.49	0.47	0.82	4Aiv	1.2
EL76BR	139	125	56	99	1.11	0.44	0.58	0.71	4Aiv	0.9

	145	120	54	111	**1.21**	**0.45**	**0.51**	**0.76**		**1.00**
Min	139	118	47	99	1.11	0.40	0.47	0.71		0.90
Max	153	125	58	125	1.29	0.49	0.58	0.82		1.20
Std Dev	6	3	5	11	**0.07**	**0.04**	**0.05**	**0.04**		**0.14**

Urn Number	Max Diam	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
EL75AP	243	244	122	149	0.99	0.50	0.77	0.61	5Ai	5.9
EL76LQ	239	238	136	151	1.01	0.57	0.86	0.63	5Ai	6.1
EL76QA	254	253	132	189	1.01			0.74	5Ai	6.8
EL76PU	219	226	125	139	0.97	0.55	0.79	0.63	5Ai	4.4
EL75PHd	243	233	153	176	1.04	0.65	0.83	0.73	5Ai	6.1

Mean	240	239	134	161	**1.00**	**0.57**	**0.81**	**0.67**		**5.86**
	219	226	122	139	0.97	0.50	0.77	0.61		4.40
Max	254	253	153	189	1.04	0.65	0.86	0.74		6.80
Std Dev	11	9	11	19	**0.02**	**0.06**	**0.03**	**0.05**		**0.79**

Urn Number	Max Diam	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
EL75BZ	174	181	90	106	0.96	0.50	0.75	0.61	5Aii	2.3
EL75DO	172	167	99	108	1.03	0.59	0.94	0.63	5Aii	1.7
EL75PP	160	167	92	100	0.96	0.55	0.80	0.63	5Aii	1.7
EL75QN	182	185	103	125	0.98	0.56	0.69	0.69	5Aii	
EL76BTg	156	151	81	94	1.03	0.53	0.86	0.61	5Aii	1.7
	169	170	93	107	**0.99**	**0.55**	**0.81**	**0.63**		**1.85**
Min	156	151	81	94	0.96	0.50	0.69	0.61		1.70
Max	182	185	103	125	1.03	0.59	0.94	0.69		2.30
Std Dev	10	12	8	10	**0.03**	**0.03**	**0.08**	**0.03**		**0.26**

Urn Number	Max Diam	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
EL75RAb	192	200	113	144	0.96	0.56	0.54	0.75	5Bi	4.3
EL76PT	222	215	136	156	1.03	0.63	0.84	0.70	5Bi	3.1
EL76AN	210	211	111	151	0.99	0.53	0.58	0.72	5Bi	3.7
Mean	208	209	120	150	**0.99**	**0.57**	**0.66**	**0.73**		**3.70**
Min	192	200	111	144	0.96	0.53	0.54	0.70		3.10
	222	215	136	156	1.03	0.63	0.84	0.75		4.30
Std Dev	13	6	11	5	**0.03**	**0.04**	**0.13**	**0.02**		**0.49**

Urn Number	Max Diam	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
EL75JVa	171	169	86	124	1.01	0.51	0.57	0.72	5Bii	1.9
EL75PHc	181	183	83	131	0.98	0.45	0.50	0.72	5Bii	2.5
EL76BTc	160	188	86	108	0.85	0.46	0.51	0.68	5Bii	1.8
EL75KXb	153	207	103	108	0.74	0.50	0.43	0.71	5Bii	2
	166	187	90	118	0.90	0.48	0.50	0.71		**2.05**
Min	153	169	83	108	0.74	0.45	0.43	0.68		1.80
Max	181	207	103	131	1.01	0.51	0.57	0.72		2.50
Std Dev	11	13	8	10	0.11	0.02	0.05	0.02		**0.27**

Urn Number	Max Diam	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Form Group	Volumes
EL75OT	153	142	76	111	1.08	0.54	0.64	0.73	5Biii	1.2
	153	142	76	111	1.08	0.54	0.64	0.73		**1.20**
Min	153	142	76	111	1.08	0.54	0.64	0.73		1.20
Max	153	142	76	111	1.08	0.54	0.64	0.73		1.20
Std Dev	0	0	0	0	0.00	0.00	0.00	0.00		**0.00**

Ungrouped

Urn Number	Max Diameter	Height	Height MD	Rim Diameter	Ratio1	Ratio2	Ratio3	Ratio 5	Suggested Group
EL75AQ	157	126	76	138	1.24	0.60	0.39	0.88	2Aiii/3Aiii
EL75FU	258	225	94	149	1.15	0.42	0.84	0.58	1Bi
EL75GT	299	229	106	169	1.30	0.46	1.04	0.57	6A
EL75NV	281	254	138	163	1.10	0.54	1.01	0.58	1Bii/2Aii
EL75QQa	213	213	104	185	1.00	0.49	0.26	0.87	5Bi
EL76AW	221	194	97	125	1.14	0.50	0.99	0.57	4Aii
EL76DP	142	168	96	81	0.84	0.57	0.85	0.57	?
EL76FC	168	168	94	111	1.00	0.56	0.77	0.66	4Aii
EL76HS	200	186	101	114	1.07	0.54	1.02	0.57	4Aii
EL76NW	150	131	58	94	1.15	0.45	0.77	0.63	4Aiv

Appendix C: Elsham Phasing

Appendix D.1

Urn Number	cname	Decorative Group	Earliest Phase	Latest Phase	Indicator of Use	Thin Section Number
818	FE	22s			1	
750	ESAXLOC	00s				
804	FE	01				
757	SST	01				
802	SST	00				MT167
736	FE	14a	1	1	1	
756	CHARN	03s	1	3	1	
737	LIM	01			1	
751	FE	01b			1	
752	ESAXLOC	01				
748	SST	01				
971	SST	00				
973	LIMES	00				
938	NELESGS	22a	1	1	1	
992	ESAXLOC	01b			1	
882	SSTMG	01			1	
970	ECHAF	04s	2	2		
923	NELESGS	03s	1	3	1	MT180
941	ESMG	10a	1	1	1	
445	CHARN	11q	4	4		MT056
446	CHARN	00				MT051
447	CHARN	00s			1	MT048
448	LIM	00				
449	FE	00a				MT114
453	ECHAF	01			1	MT121
465	LIMES	02s	2	4	1	MT032
491	ASQSH	00			1	MT018
492	ESMG	18s	4	4	1	MT092
493	SST	00			1	MT155
494	ASSHQ	22s			1	MT017
495	ESMG	02s	2	4	1	MT090
496	LIMES	00			1	MT027
497	CHARN	00a			1	MT057
498	SST	15s	4	5		MT132
499	LIMES	00			1	
500	LIMES	01			1	
501	FE	00			1	MT103
506	ECHAF	10a	1	1	1	
508	SST	02a	3	3		
838	ESMG	00				
1005	SST	07s	2	2		
833	SSTCAC	00			1	MT003
1002	SST	01				
522	ECHAF	01	2	2		
456	FE	00a			1	
457	FE	10a	1	1	1	
537	ECHAF	11s	5	5	1	
455	ESAXLOC	00			1	
503	CHARN	07s	2	2		
560	SST	00			1	
584	FE	00s			1	
460	SST	03a	2	2	1	
458	SST	10a	1	1		MT137
466	SST	01				MT135
467	CHARN	22s				

Urn Number	cname	Decorative Group	Earliest Phase	Latest Phase	Indicator of Use	Thin Section Number
469	SST	01	2	2		
601	FE	00n				
556	SST	01				
488	ESMG	02b	1	1	1	MT091
485	SST	00	1	1	1	MT151
507	SST	01			1	
531	FE	01				
558	ESMG	03s	2	2		
317	SSTFEC	00				
563	ESAXLOC	00			1	MT008
565	CHARN	09n	5	5	1	
564	SST	00a			1	
477	SST	05b	2	2	1	
481	ESMG	01	3	3	1	MT093
550	ESMG	00			1	MT096
454	ESGSNL	07s	2	2		MT086
848	CHARN	00			1	
1007	ESMG	07b	1	4	1	
1006	ESAXLOC	08b				
800	CHARN	00a				
846	SST	00				
1013	SST	00			1	
847	ESMG	00			1	MT001
483	FE	22n				
551	SST	00			1	
450	SST	00	1	1	1	
502	FE	01				
505	SST	01			1	
768	LIM	03a	2	2	1	MT042
773	FE	05n	4	4	1	
843	ESMG	00				
1001	ESAXLOC	00				
365	FE	00			1	
366	SSTMG	01			1	
300	ECHAF	01				
406	LIMES	01				
334	SSTFEC	01				
389	LIM	09n	5	5		MT041
504	LIM	01				MT044
382	SSTFEC	06s	2	2	1	
462	CHARN	01			1	
474	FE	00				
473	FE	00			1	
472	LIM	00				
482	ESAXLOC	01				
575	SSTCAC	19n	4	5	1	MT004
293	SSTFEC	10a	1	1		
303	SST	01				
302	SST	10a	1	1	1	
299	SST	01			1	
307	SST	00	0	0		
189	FE	07b	2	2		
205	SST	01				
178	FE	19b	1	1		
117	FE	05b	2	2		

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Urn Number	cname	Decorative Group	Earliest Phase	Latest Phase	Indicator of Use	Thin Section Number
520	SST	02a	3	3	1	MT148
533	ESAXLOC	01b	4	4	1	MT072
535	ECHAF	01	4	4		MT129
568	ESMG	01			1	MT094
573	SST	02s	2	4		MT152
589	SST	01			1	MT154
593	CHARN	01b	1	5	1	MT047
686	CHARN	00s				
690	FE	02s	4	4	1	MT106
693	SSTFEC	10s	3	4	1	MT007
709	LIM	09n	5	5	1	MT039
769	SST	01				MT147
772	FE	01				MT115
832	FE	00				
835	SSTMG	00				MT021
836	SSTNL	00				MT080
839	FE	01				MT109
841	SST	18a			1	MT142
842	SST	00				
844	SSTCAC	00				MT002
845	LIMES	22s			1	MT029
261	LIM	05n	4	4		MT037
283	SST	09b	1	1	1	
284	ESGS	18s	4	4	1	MT024
291	SST	14b	1	1	1	
294	LIMES	07s	2	2		MT038
296	SST	07b	2	2	1	
312	ESAXLOC	01			1	MT070
313	LIM	06s	2	2	1	
325	ESGSNL	05n	4	4	1	MT087
326	SST	07s	2	2		MT144
345	FE	00			1	MT113
348	SST	01	3	4	1	MT133
368	CHARN	05n	4	4	1	MT050
370	CHARN	12s	4	4		MT055
376	ESAXLOC	01			1	MT071
379	SST	09s	3	3	1	
381	SST	01			1	
384	ECHAF	07n	2	2	1	
401	SST	01				
407	SST	09n	5	5	1	
413	ESAXLOC	00				
112	CHARN	00a	3	5		
721	ESAXLOC	00			1	
1159	SST	01			1	
1095	SST	10s	3	4	1	
1078	SSTFEC	00s			1	
1198	SSTCAC	00				
1096	SST	01			1	
696	SST	00				
770	SSTFEC	01			1	
771	ECHAF	00			1	
1070	SST	15s	5	5	1	
766	SSTCAC	00				
695	ECHAF	00a			1	

Urn Number	cname	Decorative Group	Earliest Phase	Latest Phase	Indicator of Use	Thin Section Number
730	ASSH	10a	1	1	1	
785	CHARN	20n	1	3	1	
685	LIMES	20n	1	3		MT030
794	ECHAF	01	1	1		
728	SST	19b	1	1	1	
784	FE	01				
1066	SST	01p	3	3	1	
793	SSTMG	19b	1	1		
287	ESAXLOC	00	1	1	1	
1107	SSTMG	02s	4	4	1	
932	FE	13b	1	4		MT100
1017	SST	05n	4	4		MT143
1018	ECHAF	15s	4	5	1	MT126
1019	SST	02a	3	3		MT145
1020	FE	01				MT102
1029	FE	10a	1	1		MT108
1023	SST	01			1	MT157
1024	SST	01	1	3		MT156
1028	LIMES	00a				MT028
1030	ESGS	01				MT022
1031	ESMG	05a	1	1	1	MT095
1033	SST	01	1	3	1	
1034	CHARN	01			1	
1039	ESMG	07b	2	2	1	
1040	ECHAF	22s	2	2		
1044	SST	02a	3	3	1	
1045	FE	02s	2	4		MT120
1046	ESAXLOC	05b	2	2	1	
1052	LIM	09n	5	5	1	
1053	LIMES	10a	1	1		
1054	LIM	01b				MT040
82	ESAXLOC	10s	3	4		MT073
85	ECHAF	22n				MT123
87	SSTNL	01	4	4		MT081
100	FE	01	1	3	1	MT107
102	CHARN	10s	3	4		MT049
105	SSTFEC	01				MT006
118	SST	01	2	5	1	MT158
119	FE	10a	1	1		MT110
125	ESMG	00n			1	MT088
133	FE	00				MT119
142	FE	00s				MT105
152	SSTFEC	01				MT014
161	FE	00a				MT112
167	SST	00a				
177	FE	02a	2	4		MT101
190	FE	01	1	1	1	MT099
195	SSTFEC	22a				MT010
198	SST	22s				MT149
201	SST	00				MT146
206	ECHAF	01	3	4	1	MT130
219	ESMG	08b			1	MT089
231	SST	00s				MT141
232	ESAXLOC	22n				MT076
233	ECHAF	22n			1	MT127

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Urn Number	cname	Decorative Group	Earliest Phase	Latest Phase	Indicator of Use	Thin Section Number
234	ECHAF	07b	1	2		MT131
235	CHARN	16b	1	1	1	MT052
239	CHARN	10s	3	4		MT046
243	ESAXLOC	00				
260	LIMES	01	4	5	1	
414	FE	10s	3	4	1	MT117
423	SST	00s			1	
424	ESAXLOC	00				
426	FE	01			1	MT111
427	FE	18a				MT118
428	SST	06s	2	2		
429	ECHAF	15s	4	4		MT125
431	ECHAF	15s	5	5		MT128
441	ESAXLOC	01				MT074
442	SSTNL	02a	3	3	1	MT082
1071	SSTCAC	12a				MT005
386	SST	02s	2	2	1	
385	ESAXLOC	10s	3	3	1	
270	ECHAF	19n	4	5	1	
263	ECHAF	02b	1	1	1	
275	LIMES	01	2	2	1	
290	ECHAF	01			1	
344	SST	04a	4	4	1	
253	SST	00			1	
305	CHARN	01				MT053
254	SST	00				
267	ECHAF	01				
295	CHARN	00s				
256	CHARN	07b	1	2		
419	SSTNL	00				
417	ECHAF	01			1	
538	SST	00			1	
526	SST	00				
510	SST	05s	1	2		
512	SSTMG	00b			1	
539	LIM	00a			1	MT043
525	SST	01				
516	ESGS	10s	3	4		MT026
524	FE	01b				
511	SST	19s	2	2		
523	CHARN	09b	1	1		MT054
1051	ESAXLOC	01	4	4		MT075
387	FE	15s	4	5	1	
395	SST	03a	2	2		
399	SST	07b	1	2	1	
393	SST	05b	2	2		
397	FE	13b	1	4		
421	SST	01	5	5		
160	SST	00			1	
156	CHARN	00			1	
224	FE	01b	2	5		
158	LIMES	14b	1	1		
70	SST	01				
157	FE	00			1	
383	CHARN	10s	4	4		

Urn Number	cname	Decorative Group	Earliest Phase	Latest Phase	Indicator of Use	Thin Section Number
1038	LIMES	00n				MT033
1037	SST	14a	1	1	1	
286	SST	20n	1	3	1	
579	ECHAF	10s	3	4		
596	CHARN	10b				
598	ESGSNL	02s	2	4		
590	ESAXLOC	02s	2	4		
581	ESGSNL	00				MT085
580	CHARN	01			1	
592	CHARN	01				
347	SSTNL	01			1	
327	SSTFEC	10s	4	4		MT012
321	ECHAF	01				
339	SSTMG	01				MT020
337	ESGSNL	01				MT084
350	ESGS	01			1	
323	CHARN	09n	5	5		
310	ESAXLOC	10s	3	4		
281	ECHAF	01			1	
298	FE	00			1	
297	FE	01				MT138
292	LIM	22s				MT045
999	SST	00				
1010	ECHAF	00				MT122
987	ASSHQ	01			1	MT016
1012	SST	00			1	MT136
1009	SST	00n				
1011	SSTNL	00				
1014	ESGSNL	19n	4	5		
997	SST	01			1	
168	FE	01	1	1	1	
301	SST	00				
418	SST	00			1	
93	SSTFEC	00s			1	
83	CHARN	05b	2	2	1	
115	SSTFEC	05b	2	2	1	MT011
408	ESGSNL	12n			1	
179	FE	01			1	
41	SST	00s			1	
42	SST	02a	3	3	1	MT139
54	SST	10s	3	4		
48	SSTMG	00			1	
47	SST	01			1	
240	SST	00a				
182	SSTMG	00a			1	
43	ESMG	00			1	
241	CHARN	00a				
49	SST	07a	1	1		
44	SST	01				
106	FE	01	3	4		
50	CHARN	08a	3	3	1	
197	FE	01	1	1	1	
121	FE	05a	1	2		
185	ESAXLOC	01			1	
131	ESAXLOC	01	1	1		

Urn Number	cname	Decorative Group	Earliest Phase	Latest Phase	Indicator of Use	Thin Section Number
390	LIMES	02s	4	4		
411	ECHAF	00			1	
398	SST	16b	1	1	1	
391	ECHAF	02s	2	4		
416	ESAXLOC	02s	3	4	1	
1050	ECHAF	01	4	4		
541	ASSH	13n	1	1		MT015
542	SSTMG	00b				
559	SST	10a	1	1	1	
1099	CHARN	01			1	
597	SSTFEC	04n				
1098	CHARN	01			1	
548	SST	09n	5	5	1	
543	ESAXLOC	08m	1	1	1	
553	CHARN	00				
569	CHARN	02s	2	4		
475	ESGS	00a			1	MT023
476	SSTMG	00a				
1055	ASQSH	11q	4	4	1	MT019
578	FE	01	4	5	1	
577	FE	10s	3	4	1	MT104
570	SST	00				
571	ESMG	01			1	
486	CHARN	03a	2	2		
1056	SST	00				
487	ESMG	03s	1	3		
549	CHARN	00				
480	ESAXLOC	00				
1057	LIMES	13b	1	4		
1058	ECHAF	15s	4	4		
1059	LIMES	05s	2	2		
529	ECHAF	01	1	3	1	
1061	SSTFEC	01				
264	SST	01				
252	FE	01				
250	SST	01			1	
251	SST	12s	4	4		
259	ESAXLOC	10x	5	5	1	
163	CHARN	00a			1	
166	SSTMG	00s			1	
123	FE	14a	1	1	1	
81	SST	01				
140	FE	00				
128	SSTCAC	01			1	
319	FE	01			1	
436	CHARN	01	0	0		
130	CHARN	14a	1	1		
103	ESGSNL	01b				MT083
144	SST	01p	4	4	1	
360	ECHAF	10s	3	3		
324	FE	01			1	
320	SSTFEC	01				MT013
361	SST	09b	1	1	1	
1043	ECHAF	01	0	0		
545	SST	05b	2	2	1	

Urn Number	cname	Decorative Group	Earliest Phase	Latest Phase	Indicator of Use	Thin Section Number
515	ESAXLOC	01				
554	LIM	01b			1	MT035
517	SST	01			1	
555	SST	18a				
514	ESAXLOC	13b	1	4		
518	ECHAF	01				
95	FE	02a	3	3		MT097
165	SST	00				
1022	ESAXLOC	02s	3	4		
159	SST	00a			1	
196	CHARN	12a			1	
187	LIM	01	4	5		
188	SST	07s	2	2		
372	ECHAF	01				
374	CHARN	07a	1	1	1	
400	SST	10s	3	4	1	
1047	ESAXLOC	01				
1048	SST	00			1	
409	SST	01			1	
410	ESAXLOC	01			1	
148	ECHAF	01			1	
220	SST	01				
120	SST	10a	1	1	1	
138	CHARN	02a	3	3		
75	CHARN	01b			1	
79	FE	07a	1	1		
127	LIMES	01			1	
8	SST	00				
9	CHARN	01				
222	LIMES	05s	2	2	1	
1026	LIMES	19b	1	1	1	
274	FE	00	3	3		
1036	FE	22s	1	3	1	
285	SST	22n	1	3	1	
265	CHARN	13n	1	1		Mt058
255	ESGS	02s	2	4	1	MT025
279	SST	22s				MT140
94	ERRA	00				MT063
191	SST	08b				
207	SSTFEC	01	2	5	1	Mt009
1027	ECHAF	10a	1	1	1	
2	FE	01				
10	FE	00				MT116
1	SST	02a	3	3		
7	SST	00			1	
4	FE	07n	2	2		
3	ASSHQ	00				
6	SST	00				
5	FE	07b	2	2		
89	FE	10a	1	1		
59	SST	05b	2	2	1	
415	SST	02s	4	4		
108	CHARN	01				
134	SST	15s	4	5		
437	FE	00				

Urn Number	cname	Decorative Group	Earliest Phase	Latest Phase	Indicator of Use	Thin Section Number
438	FE	00a				
135	FE	02a	3	3		
122	FE	01				
278	FE	03a	2	2		
435	LIMES	02a	3	3	1	
434	SST	02s	3	4	1	
432	ESGSNL	00s	1	4	1	
116	LIM	00a	5	5		MT036
268	CHARN	00				
276	SST	01			1	
277	SSTFEC	01				
315	SST	00s	1	3		
318	SST	19b	1	1	1	
151	ESMG	09b	1	1	1	
154	ECHAF	01			1	
221	ECHAF	01				
439	LIMES	00b			1	
143	SST	00				
99	SST	00				
246	SST	00			1	
96	FE	01				
930	CHARN	01p	3	5		
901	SST	01				
97	CHARN	01			1	
51	FE	05a			1	
352	ECHAF	10s	3	4	1	MT124
359	SST	01	2	5	1	
367	FE	01				
363	FE	10a	1	1		
362	SST	08m	1	1	1	
356	SST	05a	1	2		
729	SST	10s	4	4	1	
214	SST	02s	3	4		
227	CHARN					
225	LIMES	00n			1	MT031
111	FE	01				
223	FE	00s				
150	FE	01				
149	SST	00				
88	LIM	01				MT034
215	SST	09b	1	1	1	
226	FE	01			1	
38	SST	00				
32	SST	00				
22	SST	00				
34	CHARN	00				
1116	SST	00				
40	SST	00				
31	SST	00			1	
340	CHARN	02a	3	3	1	
28	SSTMG	18a				
35	LIMES	00				
23	SST	00				
26	ESAXLOC	00				
25	SST	00			1	

Urn Number	cname	Decorative Group	Earliest Phase	Latest Phase	Indicator of Use	Thin Section Number
39	SST	00			1	
30	ESAXLOC	00a			1	
36	SST	00				
33	ESGSNL	00				
24	FE	00				
27	SST	03a	2	2	1	
37	SST	00				
109	SST	05b	2	2	1	
86	LIM	10s	4	4		
245	FE	00			1	
139	SST	14b	1	1	1	
329	SST	10s	3	4	1	
341	FE	01			1	
343	LIM	01	1	2		
1042	ESAXLOC	03s	1	1	1	
1041	SST	12s	4	4	1	
342	ESGSNL	10s	4	4		
164	FE	00a			1	
203	SST	00			1	
90	FE	10a	1	1		
184	CHARN	01				
136	ESAXLOC	13b	1	4	1	
355	ESAXLOC	09n	5	5	1	
798	ECHAF	01				
330	ECHAF	15s	4	5		
719	SST	16b	1	1	1	
982	FE	01				
354	NELESGS	01			1	MT067
78	FE	01			1	
229	SSTMG	01			1	
309	SSTNL	02b	1	1		MT078
781	SST	01p	3	4	1	
272	FE	01	2	2	1	
753	CHARN	01			1	
1060	SST	01	1	2		
209	ESAXLOC	01			1	
632	SST	07a	1	1		
622	SSTMG	10s	3	4		
710	FE	10s	4	4		
519	SST	15s	5	5		MT150
230	SST	01			1	
280	SST	01	3	5	1	
236	SST	02s	4	4	1	
464	ELCHARNLOC	02s	2	4	1	MT062
663	FE	05b	2	2		
796	SST	10a	1	1		MT153
528	SST	07n	1	2		
760	SST	07b	1	2	1	
789	FE	04n			1	
162	SST	01				
132	SST	01				
126	CHARN	01			1	
124	ECHAF	10a	1	1		
282	FE	01	2	2		

Urn Number	cname	Decorative Group	Earliest Phase	Latest Phase	Indicator of Use	Thin Section Number
562	FE	07b	1	2	1	
649	R	21	2	2		MT061
641	FE	07b	1	2	1	
643	SST	07a	1	1	1	
490	ESAXLOC	11s	5	5	1	
244	CHARN	11s	5	5		
1003	SST	10a	1	1	1	
944	ESSPIL	05b	2	2		MT065
1008	ESMG	01			1	
349	SST	18s	4	4	1	
795	SST	01			1	
943	ECHAF	04s	2	2		MT064
335	ECHAF	01			1	
153	SSTMG	05n	4	4		
141	NELESGS	10s	3	4	1	MT068
77	NELESGS	10x	5	5	1	MT069
288	FE	02a	3	3	1	
484	SST	02b	1	1	1	
722	ESAXLOC	03a	2	2	1	
739	ESAXLOC	02s	2	4	1	
64	FE	07a	1	1		
247	CHARN	01p	5	5	1	
650	SST	03s	2	2		
544	FE	16b	1	1	1	MT098
738	SST	16b	1	1		MT134
273	FE	10s	4	4		
71	FE	10a	1	1		
809	R	21	2	2		MT060
828	R	21	2	2		MT059
815	LIMES	10a	1	1		
873	ESMG	09n	5	5	1	
110	FE	01				
892	ESAXLOC	09n	5	5	1	
60	CHARN	07a	1	1		
213	CHARN	00n			1	
192	ESMG	07a	1	1	1	
113	SST	10a	1	1		
114	SST	10x	5	5	1	
591	SST	01			1	
998	SST	01			1	
405	FE	06s	2	2	1	
404	SST	08s				
452	SST	02s	4	4	1	
470	ESAXLOC	03a	2	2		
634	FE	02s	3	4		
940	SST	01				
934	SST	13n	1	1		
378	FE	04a	4	4	1	
521	FE	22n				
689	SST	19b	1	1		
174	ESAXLOC	02b	1	1	1	
172	SST	14a	1	1	1	
170	SST	01	1	1	1	
169	FE	08a	3	3	1	
92	LIMES	07b	1	2		

Urn Number	cname	Decorative Group	Earliest Phase	Latest Phase	Indicator of Use	Thin Section Number
422	LIMES	04s	2	2	1	
394	ESSPIL	09s	3	3	1	MT066
831	SST	18s	4	4	1	
402	SST	19n	4	5	1	
98	FE	02a	3	3	1	
80	SSTNL	05a	1	2	1	
380	SST	22n			1	
328	FE	22s			1	
547	ESAXLOC	02a	3	3	1	
788	SST	11s	5	5	1	
567	SST	10s	3	4	1	
807	SST	20n	1	3	1	
425	SST	10s	3	4	1	
338	FE	01			1	
600	SSTNL	10s	3	4	1	
697	CHARN	18a			1	
797	SSTFEC	05b	2	2	1	
1004	SSTNL	04a	4	4	1	
1000	CHARN	04a	4	4	1	
146	SST	10b			1	
585	SSTNL	14b	1	1	1	
68	ECHAF	05b	2	2		
443	ESMG	10a	1	1	1	
877	ESGSNL	02s	3	4		
84	SST	09n	5	5	1	
532	SST	12n				
588	SSTNL	01			1	MT079
63	FE	19b	1	1		
237	SST	20n	2	3	1	
954	SST	20n	1	3	1	
242	FE	20n	1	1	1	
513	SST	02s	2	4	1	
262	ESGS	10a	1	1	1	
377	SST	01	2	2	1	
478	ESMG	01			1	
853	LIM	01				
995	SST	00				
855	ECHAF	00			1	MT196
993	SST	00			1	
1072	LIMES	00s				
852	ESSPIL	07a	1	1		MT176
851	SST	03s	1	3		
850	LIM	02s	2	4	1	
857	SST	11s	5	5	1	
858	ESAXLOC	00			1	
994	FE	01				
854	SST	18s	4	4	1	MT163
859	ECHAF	06n	2	2	1	MT193
628	FE	00				
629	SST	00				
607	SSTFEC	00			1	
656	ESAXLOC	00				
674	CHARN	00			1	
678	ESAXLOC	00s			1	MT188
799	SST	08m	1	1		

Urn Number	cname	Decorative Group	Earliest Phase	Latest Phase	Indicator of Use	Thin Section Number
626	SST	00			1	
610	SSTMG	00				
611	SST	00s				MT165
617	ESMG	10a	1	1	1	
625	ESAXLOC	00			1	MT190
787	ESGSNL	01				
791	CHARN	10s	3	4		
786	SST	07b	1	2	1	MT169
740	CHARN	00a			1	
735	SSTNL	00s				
764	SSTFEC	00				
767	ESAXLOC	00				
732	SST	02s	2	4	1	
755	SST	00			1	MT168
754	LIMES	00				
749	ESMG	01				
734	FE	00				
619	SST	01b			1	
653	CHARN	00a				
631	SST	00				
621	ESGSNL	00				
620	SST	00				
642	SST	00a				MT164
679	ESAXLOC	06s	2	2	1	
639	CHARN	13n	1	1	1	
624	SST	07s	2	2		
614	SST	00			1	
608	SST	00				
623	SST	00				
814	SSTNL	00a				
811	FE	00s				
817	SSTFEC	05a	1	2		
775	ECHAF	00			1	
821	SSTNL	06q	3	3	1	MT177
1163	SST	08a	3	3		
774	SSTFEC	00				
813	CHARN	09n	5	5	1	
812	ESMG	01			1	
819	FE	13n	1	1	1	
939	SST	00			1	
972	ECHAF	00			1	
981	ASQSH	01	2	5		
988	ECHAF	10a	1	1		MT197
883	ECHAF	15s	4	5		
897	FE	19b	1	1		
936	SST	10a	1	1	1	
935	ESGS	01			1	
964	SSTNL	00a				
884	FE	01			1	
894	ASSHQ	00			1	
951	ESSPIL	12n			1	
908	SST	00			1	
955	SST	14a	1	1		
1062	ESAXLOC	00				
661	SST	05a	1	2		

Urn Number	cname	Decorative Group	Earliest Phase	Latest Phase	Indicator of Use	Thin Section Number
630	SST	00			1	
662	FE	01				
606	ESAXLOC	00a				
660	SST	05b	2	2	1	
602	SST	00			1	MT159
627	CHARN	14b	1	1		
635	SST	00				
638	SST	00				
655	CHARN	02a	3	3		
637	CHARN	00				
651	SSTFEC	03s	1	3		
636	SST	08a	3	3		
644	FE	00				
657	FE	00			1	
640	SST	14b	1	1		
633	SST	01	3	4	1	
654	FE	10a	1	1		
705	CHARN	05a	1	2	1	
703	SST	01p	3	5	1	
708	SST	20n	1	3	1	
698	CHARN	00a				
701	SST	00s				
667	ASSH	00				MT191
700	SSTFEC	00s			1	
668	SST	14b	1	1		
699	CHARN	08b				
687	CHARN					
671	LIMES	03s	1	3		
669	SST	14b	1	1		
676	SST	19b	1	1		
672	SST	00				
670	SST	07a	1	1	1	
714	SST	11s	5	5		
727	ESAXLOC	00				
1068	SST	03b			1	
718	SST	00a	3	4		
1067	CHARN	06n	2	2	1	
713	SST	00				
715	LIM	11q	4	4	1	
716	SST	00			1	
731	CHARN	07s	2	2		
712	SST	00				
707	SSTMG	10a	1	1		
711	FE	07a	1	1	1	
604	LIMES	00s			1	
603	SST	00b				
618	SST	00				
615	SST	00				
612	SST	12s	4	4	1	
605	ESAXLOC	00b			1	
613	SST	17s	4	5		MT162
1063	ESAXX	00				MT173
648	CHARN	00			1	
684	SST	00			1	MT171
645	SST	02a	3	3	1	

Urn Number	cname	Decorative Group	Earliest Phase	Latest Phase	Indicator of Use	Thin Section Number
646	FE	00a				
673	ESAXLOC	00			1	MT186
683	ESAXLOC	00a			1	
647	FE	16b	1	1		
681	SSTNL	00a			1	
675	SST	00			1	
682	ESAXLOC	00a				MT189
691	SST	01			1	
666	SST	12b	1	1	1	
665	SST	00a				
677	SST	00s			1	
876	SSTFEC	01	3	4	1	
950	CHARN	00	1	1	1	
867	CHARN	02a	3	3	1	
952	CHARN	00				
914	SST	22s			1	
946	ECHAF	00s			1	
947	ECHAF	00a				
900	SST	16b	1	1	1	
915	SST	10s	3	4		
945	ESMG	10a	1	1	1	
903	ECHAF	02s	2	4	1	
856	SST	10s	3	4		
806	LIM	07a	1	1	1	
1026	SST	19b	1	1	1	
180	SST	01	2	5	1	
576	LIMES	01b	4	5	1	
353	FE	10s	3	4	1	
489	SST	20x				
65	FE	10b				
304	SST	05a	1	2		
371	FE	09n	5	5	1	
173	FE	07a	1	1	1	
388	SSTFEC	07s	2	2	1	
364	SST	10a	1	1	1	
357	SST	01			1	
322	CHARN	02b	1	1	1	
725	ESAXLOC	01				
745	SSTFEC	00s			1	
747	SST	00a			1	
746	CHARN	00				
1069	ESGSNL	16b	1	1		
720	SST	05n	4	4		
830	SST	08s				
816	CHARN	10s	3	4	1	
783	SST	10a	1	1	1	
780	ECHAF	10s	3	4	1	MT194
777	SST	22s				
808	SST	03a	2	2	1	
776	SST	10s	3	4		
810	FE	00			1	
779	SST	05b	2	2	1	
825	ECHAF	00				
778	ESMG	00				
805	SST	00				

Urn Number	cname	Decorative Group	Earliest Phase	Latest Phase	Indicator of Use	Thin Section Number
801	SST	22a				MT166
824	FE	01			1	
827	ESAXLOC	09n	5	5		
826	SST	00			1	
822	CHARN	00a			1	
834	FE	11a			1	
803	LIMES	12a				
922	SSTFEC	03a	2	2		
468	LIM	03s	1	3	1	
73	FE	03a	2	2	1	
257	ESMG	09s	3	3		
269	ESMG	11s	5	5	1	
331	ESMG	02b	1	1	1	
238	ESAXLOC	01			1	
228	CHARN	02s	4	4	1	
692	SST	11s	5	5		
792	ECHAF	01			1	
782	SST	10a	1	1	1	
572	SST	07n	1	2	1	
1168	SST	08a	3	3		
724	ESMG	12s	4	4	1	
403	SSTFEC	12s	4	4		
185	FE	01			1	
595	SST	00			1	
527	ECHAF	01				MT192
582	SST	05b	2	2	1	
396	CHARN	04s	2	2	1	
101	CHARN	10x	5	5	1	
1106	SST	01			1	
271	SST	01b			1	
332	ESAXLOC	10x	5	5	1	
471	ESMG	02a	3	3	1	
375	SST	08a	3	3		
155	FE	11s	5	5		
444	CHARN	07n	1	2	1	
56	SST	13b	1	4	1	
45	FE	10a	1	1	1	
29	SST	03a	2	2		
19	SST	02s	2	4		
104	FE	07a	1	1		
202	SST	02s	3	4		
420	LIM	01			1	
358	CHARN	19n	4	5	1	
204	SST	00n	2	5	1	
211	SST	10s	3	4		
175	ECHAF	10a	1	1	1	
536	SST	05n	4	4	1	
333	SST	19b	1	1	1	
316	NELESGS	10a	1	1	1	
346	SST	05s	1	2	1	
574	ESMG	01			1	
258	SSTFEC	03s	1	3	1	
890	ESAXLOC	03s	1	3	1	
790	ECHAF	01				
479	SSTCAC	09n	5	5		

Urn Number	cname	Decorative Group	Earliest Phase	Latest Phase	Indicator of Use	Thin Section Number
534	SST	19n	4	4	1	
889	SST	09n	5	5	1	
137	FE	13n	1	1		
107	SST	01	3	4	1	
412	ESMG	10s	3	4	1	
58	LIM	07n	1	2	1	
1102	SST	06s	2	2	1	
1101	SST	12a				
1100	SST	22x			1	
1202	ESAXLOC	00				
1204	MISC	00a				
1205	MISC	00a				
1206	MISC	00a				
1207	MISC	00a				
1208	MISC	00				
1209	MISC	00				
1210	MISC	00				
1124	SST	07a	1	1		
1125	ROMAN	10a	1	1		
1127	ECHAF	00				
1127	SST	00				
1201	ASSH	00				
1200	MISC	00				
1153	SST	00				
1154	LIMES	02b	1	1		
1155	ECHAF	10s	3	4		
1156	ASSH	10a	1	1		
1145	FE	00				
1146	ECHAF	00				
1147	ASSH	00				
1148	SST	10s	3	4		
1149	ROMAN	00				
1164	SST	00a				
1165	FE	00				
741	SSTFEC	14b	1	1	1	
1065	SST	11q	4	4		
763	CHARN	11s	5	5	1	
742	CHARN	11s	5	5		
723	ESAXLOC	01	3	3		
829	SST	18s	4	4	1	
744	SST	10a	1	1		
743	SST	00			1	
758	SST	01b	1	1	1	
762	SST	10s	3	4	1	
759	LIMES	05s	1	2	1	
980	FE	03a	2	2	1	
985	SST	00			1	
1082	SST	11a				
984	SSTMG	01				
983	SSTFEC	01	1	3	1	
975	ECHAF	01				
546	SST	00				
210	ESAXLOC	10x	5	5	1	MT187
176	FE	19b	1	1	1	
183	SST	05n	4	4	1	

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Urn Number	cname	Decorative Group	Earliest Phase	Latest Phase	Indicator of Use	Thin Section Number
566	SST	13n	1	1	1	
212	FE	07s	2	2	1	
336	SST	12b	1	1		
702	R	21	2	2		MT175
91	FE	10a	1	1	1	
609	SST	10b				
69	SST	01b			1	
67	SST	01			1	
208	SST	10s	3	4	1	
1174	MISC	00s			1	
181	CHARN	01			1	
862	SST	22s			1	
979	SST	11q	4	4	1	
986	SST	00				
1076	CHARN	10x	5	5	1	
978	SST	20n	1	3		
918	SST	00a			1	
913	ESMG	00a				
925	ASSH	00b				
912	CHARN	00			1	
887	FE	05b	2	2		
927	ASQSH	00				
926	FE	00			1	
886	CHARN	11s	5	5	1	
1075	SST	01			1	
916	SSTFEC	19s	2	2	1	MT178
888	LIMES	00a			1	
967	FE	01b			1	
861	SSTFEC	09b	1	1	1	
880	ECHAF	00				
706	ESSPIL	00a				
658	SSTFEC	03s	1	3		
680	SST	01				
704	ESAXLOC	06n	2	2		
1064	ASSHQ	00				
659	CHARN	00s				
823	FE	00				
936	FE	10a	1	1		
921	ESAXX	03s	1	3	1	
1077	SST	00			1	MT170
928	ESAXX	00			1	MT172
929	ESAXLOC	00			1	
991	FE	08a	3	3		
920	SST	01				
878	SST	01				MT160
881	SSTFEC	02s	2	4		
875	SST	07b	2	2	1	
55	LIM	01	2	2	1	
586	SST	01			1	
289	CHARN	03a	2	2		
193	LIMES	07b	1	1		
171	SST	14b	1	1		
459	SST	02b	1	1	1	
594	FE	10s	3	4	1	
200	FE	10s	3	4		

Urn Number	cname	Decorative Group	Earliest Phase	Latest Phase	Indicator of Use	Thin Section Number
373	ESAXLOC	10a	1	1	1	MT185
616	ESGS	03s	1	3	1	
599	SST	19n	4	5	1	
557	SST	01			1	
552	SST	12s	4	4	1	
52	FE	10a	1	1	1	
57	SST	07n	1	1	1	
976	SST	20n	1	3	1	MT181
72	ESAXLOC	04s	2	2		
314	SST	01p	3	5	1	
351	SST	22a			1	
306	SST	03a	2	2		
587	ESMG	10b			1	
540	LIM	07a	1	1	1	
194	ECHAF	12b	1	1	1	
308	FE	20n	1	3	1	
461	ECHAF	01			1	
960	FE	07b	1	2	1	
962	SST	00				
974	SST	11q	4	4	1	
919	ESAXLOC	22n				
961	R	21	2	2		MT174
949	ESAXLOC	00			1	
863	SST	00				
931	FE	00				
958	SSTFEC	00				
959	SST	10s	3	4		
937	ESAXLOC	02a	3	3	1	
860	LIM	00				
990	SST	03s	3	3		MT161
969	CHARN	01			1	
864	FE	10s	3	4		
996	SST	00			1	
849	CHARN	00				
899	CHARN	00	1	1		
896	SST	00			1	
820	CHARN	00				
66	ESAXLOC	01			1	
145	FE	10s	3	4	1	
199	FE	03s	1	3	1	
186	FE	05s	1	1		
129	FE	13n	1	1		
583	ESAXLOC	08m	1	1	1	
561	FE	01				
904	SST	10a	1	1	1	
872	ECHAF	10s	3	4		
905	LIMES	00a				
1079	SST	00s				
1080	SST	10a	1	1	1	
933	LIMES	01p	3	5		
1074	ECHAF	15s	4	5		MT195
1073	LIM	01				
869	SST	00b			1	
871	SST	02s	2	4	1	
909	CHARN	00				MT183

Urn Number	cname	Decorative Group	Earliest Phase	Latest Phase	Indicator of Use	Thin Section Number
870	SST	07n	1	2	1	
895	ESGS	07b	1	2	1	
911	CHARN	14a	1	1		MT184
942	ESGS	01			1	
907	FE	01			1	
898	SST	03s	1	3	1	
891	SST	00			1	
885	SST	01			1	
865	LIMES	07n	1	2		
893	ESMG	17s	4	5	1	MT182
874	SST	04s	2	2	1	
924	ESAXLOC	10a	1	1		
917	NELESGS	02s	2	4	1	MT179
879	FE	00			1	
866	SST	01	3	5	1	
868	FE	13n	1	1		
906	FE	01			1	
910	FE	10x	5	5		
1150	ESAXLOC	00				
1151	SST	00				
1112	LIM	01				
1110	SST	15s	5	5		
1186	SST	00a				
1111	ECHAF	11q	4	4		
509	LIM	10s	3	4	1	
440	CHARN	00a				
948	MISC	00				
1025	ESAXLOC	01				
694	MISC					
218	LIM	00a				
781	SST	01p	3	4		
765	LIMES	00	3	3	1	
311	MISC					
733	SST	00				
652	SST	00				
451	SST	20n	3	3		
369	SST	00				
217	SST	00a				
588	SSTNL	01				
953	SST	14n				
726	LIM	10s	3	4		
957	SST	14b	1	1	1	
966	FE	01			1	
965	SSTFEC	08a	3	3	1	
956	LIMES	05a	2	2	1	
968	SST	00				
902	ASSHQ	19n	4	5		
989	CHARN	11a			1	
1166	SST	06s	2	2		
1168	ECHAF	08a	3	3		
1128	LIM	00a				
1129	ESAXLOC	05b	2	2		
1199	ESAXLOC	00				
1021	SST	10s	3	4		
1117	SST	00a				

Urn Number	cname	Decorative Group	Earliest Phase	Latest Phase	Indicator of Use	Thin Section Number
1118	SSTFEC	00b				
1119	NELESGS	00				
1122	CHARN	01				
1123	FE	00a				
1120	MISC	00s				
1133	CHARN	00s				
1134	SST	00				
1135	SST	00				
1130	FE	00s				
1131	SST	00a				
1132	MISC	00				
1140	LIMES	00a				
1139	SST	05b	2	2		
1141	FE	00b				
1138	SST	05b	2	2		
1176	ESAXLOC	02s	3	4		
1177	ECHAF	00a	1	4		
1136	MISC	22s				
1137	SST	01				
1108	SST	06q	3	3		
1109	FE	02s	2	4		
1180	ESAXLOC	01	0	0		
1178	LIMES	00	0	0		
1179	LIMES	00s	1	1		
1182	SST	00	1	1		
1181	ECHAF	14a	1	1		
1185	FE	10s	3	3		
1183	LIM	00	1	3		
1184	SST	00	1	3		
18	SST	01				
21	SST	00				
11	FE	00b			1	
17	ESAXLOC	00s				
15	FE	00			1	
14	SSTMG	00			1	
13	SST	00			1	
16	SST	00a			1	
20	SST	10a	1	1		
12	SST	14n	1	1		
62	SST	01				
76	ESAXLOC	00	5	5		MT077

Urn number	cname	Thin Section Number	Decorative Group	Cleatham Phase	Sign of Use
EL75AW	SSTFEC		10s or 10 a	3-4 or 1	1
EL75AY	ESMG		10a	1	1
EL75AZ	SST		00		0
EL75AX	LIMES	ELAJ035	01	1-5	1
EL75BI	LIM		05b	2	1
EL75BQa	SST		02s	2-4	1
EL75BQb	FE	ELAJ092	00		1
EL75BL	ESMG	ELAJ121	00		0
EL75BOa	SSTFEC	ELAJ024	11a		1
EL75BOb	SST	ELAJ077	00a		1
EL75BM	SSTCAC		10a	1	1
EL75EJ	NELESGS		10s	3-4	1
EL75EM	NELESGS		00		0
EL75EP	ESMG	ELAJ031	05b or 14b	1-2	0
EL75EL	LIM	ELAJ026	10s	3-4	1
EL75EO	SST		00b		1
EL75ER	SST		01	1-5	1
EL75FSa	SSTMG		00a		1
EL75FSb	NELESGS		10s	3-4	0
EL75FQ	SSTCAC		00		0
EL75FT	SSTMG		00		0
EL75FR	SST		00		1
EL75GKa	SSTFEC		22s		0
EL75GKb	SSTMG		00a		1
EL75GKc	NELESGS		00		1
EL75GL	ESMGFE	ELAJ032	01	1-5	1
EL75GOa	FE		00a		0
EL75GOb	SST		00		0
EL75GS	ESMG	ELAJ006	00		0
EL75GV	SST		00s		0
EL75GW	ESMG		00a		0
EL75GZ	SSTFEC	ELAJ025	01		0
EL75HEa	CHARN	ELAJ059	01		1
EL75HEb	NELESGS		00		0
EL75HF	FE		00		0
EL75JC	ESMG		05a or 07a	1-2	0
EL75JIa	SST		02a	2-4	0
EL75JH	NELESGS		00		0
EL75JG	ERRA		00		1
EL75JJ	CHARN		00		1
EL75JQb	NELESGS		00a		0
EL75KG	ESMG		22		1
EL75KJ	SST	ELAJ084	00		0
EL75KM	SST	ELAJ073	00		0
EL75KN	LIMES	ELAJ036	00		1
EL75KO	NELESGS		00		0

Urn number	cname	Thin Section Number	Decorative Group	Cleatham Phase	Sign of Use
EL75KR	CHARN		07n	1-2	0
EL75KZ	ESMG		02s	2-4	1
EL75KY	ESMG		07b	1-2	0
EL75LAb	ERRA		19q		0
EL75LGa	NELESGS		00s		0
EL75LI	ESMG	ELAJ005	00		0
EL75LP	SST		00a		1
EL75LR	SSTCAC		00a		0
EL75LS	ESMG		00a		0
EL75LV	SST		00		1
EL75LX	ESMG		10s	3-4	1
EL75MJ	ESMG	ELAJ009	01	1-5	0
EL75MN	SSTCAC		01	1-5	1
EL75MO	ESMG	ELAJ003	00		0
EL75MP	ESMG	ELAJ004	00s		0
EL75MR	NELESGS		22a		0
EL75NE	ESMG		10s	3-4	0
EL75NF	ESMG		01	1-5	1
EL75NJ	SSTCL		07n	1-2	1
EL75NK	NELESGS		00b		0
EL75NL	NELESGS		00s		1
EL75NN	FE		00		0
EL75NY	ESGS		10s	3-4	0
EL75PBb	NELESGS		20n	1-3	0
EL75PEa	CHARN		00b		0
EL75PEb	ESMG		00n		1
EL75PGa	ESMG		10s	3-4	0
EL75PGb	SST		00		0
EL75PGc	ESMG		00		0
EL75PHb	ESMG	ELAJ007	07a	1	0
EL75PHc	NELESGS	ELAJ015	10s	3-4	0
EL75PHd	NELESGS	ELAJ011	01	2-4	1
EL75PLb	NELESGS	ELAJ010	01	1-5	1
EL75PL	SST		00a		0
EL75QU	FE		10s	3-4	1
EL75QW	ESMG		05b	2	1
EL75QX	NELESGS		01	1-5	1
EL75RAa	ESMG		01p	3-5	1
EL75RAb	NELESGS	ELAJ012	02s	2-4	1
EL76BJ	SSTFEC	ELAJ022	07n	1-2	0
EL76BM	SST		00a		1
EL76BO	ERRA		07s	2	1
EL76BQ	SSTFEC		10a	1	0
EL76BS	SSTFEC		01	1-5	1
EL76BPb	NELESGS		10s	3-4	0
EL76CE	ESMG		09s	3-5	0
EL76CH	CHARN	ELAJ060	01	1-5	0
EL76CAa	LIMES	ELAJ034	07a	1-2	1
EL76CAb	CHARN		05b	2	1

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Urn number	cname	Thin Section Number	Decorative Group	Cleatham Phase	Sign of Use
EL76CJ	SSTFEC		07b	1	1
EL76DJ	SSTFEC	ELAJ107	01b	1-5	0
EL76DK	NELESGS	ELAJ013	00		0
EL76FG	ESMG	ELAJ008	00		0
EL76FB	ESAXLOC		01p	3-5	1
EL76FF	SST		00a		0
EL76FD	ESGSNL		05b	2	1
EL76EQ	SSTCAC		08a/08b	3	0
EL76FH	ERRA	ELAJ094	05a	1-2	1
EL76FI	NELESGS	ELAJ014	00		1
EL76FK	CHARN		00		0
EL76FL	FE	ELAJ087	00a		0
EL76FM	NELESGS		02n		0
EL76FN	LIM	ELAJ028	00s		1
EL76FQ	FE		00		0
EL76FR	ERRA		00		1
EL76FT	ESMG		01		1
EL76FU	ASSHQ	ELAJ105	00a		1
EL76GE	SST		07q		0
EL76GF	SSTMG		01	1-5	0
EL76GG	ESAXLOC		07a	1	1
EL76KE	SST	ELAJ078	07b	1-4	1
EL76GV	ESAXLOC		00		1
EL76GW	ESAXLOC		00		1
EL76HC	LIMES		00a		0
EL76HD	SSTCAC		00a		0
EL76IK	FE		16b	1	1
EL76IM	ESCMG	ELAJ019	00a		0
EL76ITa	SSTCAC	ELAJ002	00		1
EL76ITb	LIM		22a		1
EL76JI	SSTMG		10b		1
EL76JH	SST		00		1
EL76JPb	SST		01	1-5	0
EL76JZ	SST		18q		1
EL76KBb	SSTCAC		00a		0
EL76KG	ESAXLOC		00		1
EL76KH	ESAXLOC		00s		1
EL76KI	NELESGS	ELAJ017	02s	2-4	0
EL76KL	ESAXLOC		01	1-5	1
EL76KR	ERRA	ELAJ095	01	1-5	1
EL76KSa	SST	ELAJ075	00b		1
EL76KSb	SSTFEC	ELAJ023	02s	2-4	1
EL76LE	SST		00s		1
EL76LG	SST		00		0
EL76LH	NELESGS	ELAJ016	01	1-5	1
EL76LI	ESCMG	ELAJ020	05a or 07a	1-2	0
EL76LJ	SSTCAC	ELAJ001	13q		0
EL76LN	ESMGFE	ELAJ030	00a		1

Urn number	cname	Thin Section Number	Decorative Group	Cleatham Phase	Sign of Use
EL76LOa	CHARN	ELAJ061	10s	3-4	1
EL76LOb	SST		00		0
EL76LOc	SSTFEC		00		1
EL76LOd	SSTCAC		00		1
EL76LP	SST		03s	1-3	1
EL76LSc	SST		09s	3-5	0
EL76LX	CHARN		00		1
EL76LY	ELQFE	ELAJ043	00		1
EL76LZ	SST	ELAJ079	10a	1	0
EL76MA	CHARN		00a		1
EL76MB	LIM		00b		0
EL76MD	FE		00		1
EL76NM	SST	ELAJ070	00s		1
EL76NO	CHARN		11q	4	1
EL76NP	LIM	ELAJ029	00a		1
EL76NS	SSTCAC		00s		1
EL76NT	CHARN		00		1
EL76NU	LIMES		00		1
EL76NV	SST	ELAJ085	05a	1-2	1
EL76NWa	NELESGS	ELAJ018	00s		0
EL76NX	LIMES	ELAJ033	00b		1
EL76NY	ESAXLOC	ELAJ051	00b		0
EL76OP	LIM	ELAJ027	10a	1	1
EL76OR	SSTFEC		00a		0
EL76OU	SST	ELAJ080	02b	1	1
EL76OV	NELESGS		00a		0
EL76OW	SSTFEC	ELAJ021	00a		0
EL76OX	SST		00		0
EL76OY	SST		00		1
EL76OZ	ERRA		00		1
EL75AL	SSTFEC		00		1
EL75AM	SST		00		0
EL75AN	NELESGS	ELAJ114	00		1
EL75AQ	ESMG	ELAJ038	10a	1	1
EL75AR	SSTFEC		00		1
EL75AS	SSTMG	ELAJ126	10s	3-4	1
EL75BW	NELESGS		00		1
EL75BV	ECHAF	ELAJ068	00		0
EL75BY	NELESGS		05n	4	0
EL75BX	SST	ELAJ081	10a	1	0
EL75CD	SST	ELAJ072	00s		1
EL75CG	SST		01	1-5	1
EL75CE	SST	ELAJ071	10a	1	0
EL75CH	SST		10a	1	0
EL75CI	NELESGS		00		1
EL75CB	ESMG	ELAJ037	05b	2	1
EL75CF	ESAXLOC		00		1
EL75CN	SSTCAC		13n	1	0

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Urn number	cname	Thin Section Number	Decorative Group	Cleatham Phase	Sign of Use
EL75GG	ELCHARNLOC	ELAJ098	10s	3-4	1
EL75GF	NELESGS	ELAJ116	01	1-5	0
EL75GI	ESMG		00		1
EL75GH	SST		10a	1	0
EL75HH	CHARN	ELAJ057	10a	1	1
EL75HJ	ECHAF	ELAJ067	00		1
EL75HK	CHARN	ELAJ063	10a	1	0
EL75HL	NELESGS	ELAJ119	10a	1	1
EL75HM	NELESGS		00		0
EL75IP	ESMG		00		1
EL75IS	ELCHARNLOC	ELAJ099	00		1
EL75JS	SST	ELAJ074	12a		1
EL75JVa	ASSHQ	ELAJ102	07s	2	1
EL75JVb	NELESGS		01	1-5	1
EL75JVc	NELESGS		01	1-5	0
EL75JW	NELESGS		00a		0
EL75JZ	NELESGS		01	1-5	0
EL75MW	ESMG		00		0
EL75MX	SSTCAC		00		0
EL75MZ	NELESGS		00		1
EL75NC	ELCHARNLOC	ELAJ101	19n	4-5	0
EL75PQa	NELESGS		07s	2	0
EL75PQb	NELESGS		00		0
EL75PQc	ELCHARNLOC	ELAJ062	00		0
EL75PV	SST		02s	2-4	0
EL75PVb	ESMG		00s		1
EL75PVc	SSTCAC		10s	3-4	0
EL75PUa	NELESGS		10x	5	0
EL75PW	SSTCAC	ELAJ132	10b		1
EL75QD	ESMG	ELAJ122	00		0
EL75QE	ESAXLOC		05s	1-2	0
EL75QIb	NELESGS		00s		0
EL75QMb	CHARN		10s	3-4	1
EL75QK	FE	ELAJ091	10s	3-4	1
EL75QJ	ESCMG	ELAJ123	00a		1
EL75QPa	NELESGS		10s	3-4	0
EL75QPb	SSTCAC		00		0
EL75QQb	ESMG		12s/10s		1
EL75QQc	ESMG		00		0
EL75RHc	NELESGS		10s	3-4	0
EL76AVb	SSTCAC	ELAJ130	9s or 11s	3-5	0
EL76AXa	SSTFEC	ELAJ109	01	1-5	1
EL76AXb	NELESGS		00		1
EL76AY	ESMG		00		1
EL76BI	NELESGS		01	1-5	0

Urn number	cname	Thin Section Number	Decorative Group	Cleatham Phase	Sign of Use
EL76BH	CHARN		01	1-5	1
EL76BTb	SSTFEC		10S	3-4	1
EL76BTc	SSTFEC		10s	3-4	0
EL76BTd	CHARN		13?		0
EL76CS	FE	ELAJ089	22s		1
EL76CQ	SST		05s	1-2	0
EL76DL	NELESGS	ELAJ113	10s	3-4	0
EL76DNa	SSTCAC		00		1
EL76DNb	NELESGS		02a	2-4	0
EL76CK	SST		05n	4	1
EL76CO	NELESGS		07n	1-2	1
EL76CTa	CHARN	ELAJ064	01	1-5	0
EL76CTb	CHARN		01	1-5	1
EL76CTc	CHARN	ELAJ058	10s	3-4	1
EL76CTd	SST	ELAJ083	00		1
EL76DC	CHARN	ELAJ054	00s		1
EL76MOa	SSTMG		01b	1-5	1
EL76MR	SST		00b		1
EL76MS	SST		10a	1	0
EL76MU	SSTFEC		11s	5	1
EL76MV	SSTFEC		00a		0
EL76NCa	SSTFEC	ELAJ108	00		1
EL76NCb	SSTFEC	ELAJ112	00a		1
EL76ND	ESAXLOC		00a		0
EL76NEb	SSTFEC	ELAJ111	15s	4-5	0
EL76OM	SST		00a		1
EL76ON	SST	ELAJ082	00		1
EL76OO	ESMG		00		0
EL76PA	CHARN	ELAJ065	10a	1	0
EL76QAb	SST		00		1
EL76IFa	SST		01	1-5	0
EL76IH	NELESGS		10a	1	1
EL76IC	CHARN	ELAJ055	00		0
EL76ASb	ESMG		00		1
EL76ASa	NELESGS		00		0
EL76AGb	SST		00b		1
EL76AG	NELESGS		00		1
EL76AE	SSTCAC		00		1
EL76AT	ELCHARNLOC		07a	1	1
EL75GAb	ESMG		10a	1	0
EL75GAa	ESAXLOC	ELAJ049	00	1	1
EL75GC	FE	ELAJ093	00		0
EL75GBb	ESMG		00		0
EL75GBa	ESMG		10s	3-4	1
EL75BBb	NELESGS	ELAJ120	00		0
EL75BBa	SSTFEC	ELAJ115	10s	3-4	1
EL75BA	SSTFEC		10a	1	1
EL76GQ	ESMG		05n		0

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Urn number	cname	Thin Section Number	Decorative Group	Cleatham Phase	Sign of Use
EL76GP	ESAXLOC	ELAJ047	00		1
El76GH	SST		07b	1-2	1
El76GK	ELCHARNLOC		00a		1
EL76GI	FE	ELAJ090	00		0
EL75KS	SST		00		1
EL75KVa	ELCHARNLOC	ELAJ096	05s/07s	1-2	1
EL75KVb	ELCHARNLOC	ELAJ097	11s	5	0
EL75KWb	SSTCAC		02a	2-4	0
EL75KXa	NELESGS	ELAJ131	01	1-5	0
EL75KXc	CHARN	ELAJ056	19n	4-5	1
EL75KXd	SSTCAC		10s	3-4	0
EL75KU	NELESGS		00		0
EL76II	NELESGS		22		1
EL75BN	NELESGS		01	1-5	0
EL75CW	ESMG		07s	2	1
EL76DO	FE		00b or 07b	1-2?	1
EL75DZ	ELCHARNLOC		19n	4-5	1
EL75FH	SST		13b	1-4	1
EL75FP	LIM		01	1-5	0
EL75GD	SST		10s?	3-4	1
EL75GM	SSTFEC		01	1-5	1
EL75GN	ESMG		01	1-5	1
EL75GR	NELESGS		12n		1
EL75HO	NELESGS		03a	2	1
EL75IV	SSTFEC		05n	4	1
EL75IZ	SST		07b	1-2	0
EL75LA	NELESGS		19q		0
EL75MI	ESAXLOC	ELAJ053	12a		0
EL75OA	SST		12a		1
EL75QS	FE		07a	1	0
EL75QV	SST		20n	1-3	1
EL76AVa	SSTCAC		13b	1-4	1
EL76CF	SST		00		1
EL76CB	SST		10a	1	0
EL76DF	ESMG		10s	3-4	1
EL76EF	SST	ELAJ076	00b		1
EL76EE	ESMG		05a		0
EL76EG	ESMG		09q or 11a	1-5	0
EL76EIb	FE		00		1
EL76EK	ESAXLOC	ELAJ052	00a		0
EL76EJa	NELESGS		10s	3-4	0
EL76EJb	SSTFEC		10s	3-4	0
EL76EJc	SSTFEC		00		1

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Urn number	cname	Thin Section Number	Decorative Group	Cleatham Phase	Sign of Use
EL76GJ	SST		14a	1	0
EL76HZ	SST		05b	2	1
EL76ED	SST		07s	2	0
EL76IE	CHARN		02s	2-4	0
EL76KBa	SSTFEC		22a		1
EL76KK	SSTCAC		01	1-5	1
EL76KO	SST		01	1-5	1
EL76KU	CHARN		08a?	3?	1
EL76MZ	SSTFEC		04s	2	1
EL75KQ	ESMG		07n	1-2	1
EL75PC	ESMG		07b	1-2	0
EL76JF	SSTCAC		10a	1	1
EL76FW	SST		05b	2	1
EL76EN	SST		05a	1-2	1
EL75PD	NELESGS		01	1-5	0
EL76JNa	ESAXLOC		00s	1-5	0
EL76IA	SSTCAC		10s	3-4	0
EL75IC	SSTCAC		12a		0
EL75JD	ESAXLOC		12a		1
EL75KD	SST		09n	5	0
EL75KT	ECHAF	ELAJ066	10q		1
EL75KXb	SSTCAC	ELAJ129	04s	2	1
EL75ON	SSTFEC		01	1-5	1
EL75OO	SST		19q		1
EL75OP	CHARN		00		0
EL75OXb	NELESGS		00s		0
EL75OZ	NELESGS		00s		0
EL75PA	NELESGS		00a		0
EL75PLa	NELESGS		01p	1-5	1
EL75QZ	ESAXLOC		13a		1
EL75RJ	ESMG		00		0
EL75RL	NELESGS		00s		1
EL75RQ	FE		10s	3-4	1
EL75RS	CHARN		00s		0
EL76AD	ESMG		22		1
EL76JN	ESAXLOC		00		0
EL76KA	ESMG		07a	1	0
EL76EP	NELESGS		12b	1	1
EL76IL	ESMG		22b		1
EL76KT	SST		01	1-5	1
EL76MC	SST		07a	1	1
EL76MN	ESMG		10s	3-4	0
EL76MPb	SST		06s	2	1
EL76MQ	SSTFEC	ELAJ106	01	1-5	1
EL76NQ	SST		07a	1	1
EL76PV	ESMG		22a		1
EL75BF	SSTCAC		00		1
EL75CR	SST		12n		0
EL76HF	SSTFEC	ELAJ118	00b		0

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Urn number	cname	Thin Section Number	Decorative Group	Cleatham Phase	Sign of Use
EL75CS	SSTFEC	ELAJ110	00		0
EL75CO	SST		00		0
EL75DJb	ESMG		07s	2	0
EL75DI	ELQFE	ELAJ044	01	1-5	1
EL75DH	SST		00s		1
EL75DK	ESMG		00a		0
EL75DT	SST		00s		0
EL75DW	CHARN		00		0
EL75DPa	ESMG		00		0
EL75DPb	SST		00		0
EL75DY	NELESGS		05n or 07n	1-2 or 4	0
EL75EB	NELESGS		07n	1-2	1
EL75DX	CHARN		00		1
EL75EA	CHARN		00		0
EL75FFb	NELESGS		01	1-5	0
EL75FJa	SSTFEC		10a	1	0
EL75FJ	SST		00a		0
EL75FJb	NELESGS		10s	3-4	0
EL75FJc	NELESGS		00		1
EL75FJd	CHARN		00s		1
EL75FI	CHARN		00s	00s	0
EL75FL	ESMG		07a	1	1
EL75HP	NELESGS	ELAJ118	00s		0
EL75HU	SST		10a	1	1
EL75IA	CHARN		00		0
EL75IB	SST		00		1
EL75ID	SSTFEC		00		1
EL75IE	NELESGS		01	1-5	0
EL75II	SSTFEC		00a		0
EL75IJ	ECHAF		00		1
EL75IK	ESMG		00		1
EL75IL	ESMG		00s		0
EL75JN	NELESGS		07n	1-2	0
EL75JP	ESMG		01		0
EL75JQ	ESMG		00a		1
EL75JR	ESMG		07s	2	0
EL75NZ	SST		02s	2-4	1
EL75OC	CHARN		00		0
El75OG	SST		00		0
EL75RG	ESMG		05n	4	1
EL75Rhb	SSTCAC		20s	1-3	1
EL76BTi	NELESGS		00s		0
EL76BTf	CHARN		02s	2-4	1
EL76BTh	SSTFEC		00s		0
EL76BTj	SST		00s		0
EL76BTg	SST		02s	2-4	0
EL76BY	SSTFEC		00		0
EL76BZ	SSTFEC		10s	3-4	1

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Urn number	cname	Thin Section Number	Decorative Group	Cleatham Phase	Sign of Use
EL76DD	CHARN		00a poss 10a	1	0
EL76DE	SSTCAC		05a	1-2	0
EL76DGa	SSTFEC		07s	2	0
EL76DGb	ESMG		00s		0
EL76DY	CHARN		07a	1-2	0
El76DQ	SSTCAC		12a		0
EL76DUa	ASSHQ	ELAJ104	01		0
EL76DUb	ESMG		07b	1-2	0
EL76DUc	ESAXLOC	ELAJ048	00a		0
EL76DV	FE		00a		1
EL76DI	SSTCAC		00		0
EL76EA	SSTCAC		00		1
EL76EL	SST		00		1
EL76EM	ESMG		00		0
EL76HN	SSTCAC		00a		1
EL76HP	ESAXLOC	ELAJ050	01	1-5	1
El76HE	ELQFE	ELAJ042	00		0
EL76HR	ESMG		00		1
El76HYa	FE		00x		0
EL76HYb	FE		00a		0
EL76JD	ESMG		00a		1
EL76IU	SST		01	1-5	0
EL76JE	SSTFEC		00a		1
EL76JC	FE	ELAJ086	05b	2	1
El76JG	SSTFEC		05s or 05a	1-2	1
EL76NH	CHARN		00		0
EL76NI	SSTFEC		01	1-5	1
EL76NJ	ESMG		09b	1	1
EL76NK	SSTFEC		01	1-5	1
EL76NL	CHARN		00a		1
EL76JR	ESMG		07n	1-2	1
EL75AE	LIMES		10b		0
EL75AF	SST		10s	3-4	1
EL75AK	SST		01	1-5	1
EL75AP	LIMES	ELAJ128	07a	1	1
EL75BJ	SSTFEC		11s	5	1
EL75BU	NELESGS		02a	2-4	0
EL75BZ	SSTFEC		19q		1
EL75CC	SSTFEC		03s	1-3	1
EL75CT	SSTFEC		02	2-4	0
EL75CP	SST		22n		1
EL75CM	ESMG		01	1-5	1
EL75DBa	NELESGS		08a	3	0
EL75DJa	SSTMG	ELAJ125	10s	3-4	0
EL76DO	SST		11s	5	1
EL75DU	SST		01p	3-5	0
EL75DN	FE	ELAJ088	07s	2	1

Urn number	cname	Thin Section Number	Decorative Group	Cleatham Phase	Sign of Use
EL75DL	ESMG		01	1-5	0
EL75EQ	SSTFEC		03a/03s	2/1-3	0
EL75FFa	CHARN		10a	1	1
EL75EU	SST		10s	3-4	1
EL75ET	NELESGS		10s	3-4	1
EL75FC	CHARN		10s	3-4	1
EL75FG	SSTFEC		03s	1-3	1
EL75GE	ESMG		10s	3-4	0
El75FN	SST		00		1
EL75FM	SSTCAC		10s	3-4	0
EL75FO	SST		18/19a	4/5	1
EL75GP	ERRA		10s	3-4	1
EL75GT	CHARN		10a	1	1
EL75GU	SST		10s	3-4	1
EL75HN	SST		09n	5	1
EL75HG	ASQSH	ELAJ103	05a	1-2	0
EL75HI	ESMG		07a	1	1
EL75HQ	NELESGS	ELAJ046	22a		1
EL75HW	SST		05b	1	1
EL75HY	NELESGS		12a		1
EL75IH	SSTFEC		07a	1	0
EL75IM	ECHAF		10s	3-4	1
EL75IX	SSTFEC		01	1-5	1
EL75IO	NELESGS		12s	4	1
EL75IU	SSTFEC		10s	3-4	0
EL75IY	SST		00		1
EL75JE	ESAXLOC		12a		1
EL75JF	SST		02n		1
EL75JU	SST		02a?		1
EL75JX	CHARN		01b	1-5	1
EL75KA	NELESGS		22s		1
EL75KB	NELESGS		00s		1
EL75KH	NELESGS		03s	1-3	1
EL75KWa	NELESGS		07a	1	0
EL75LB	FE		14s		0
EL75LH	NELESGS		20n	1-3	1
EL75LM	ESAXLOC		08a?	3	0
EL75LU	ESMG		10s	3-4	0
EL75LW	ESMG		14b	1	1
EL75ML	ESMG	ELAJ039	16b	1	0
EL75MQ	NELESGS		22a		0
EL75NA	NELESGS		09n	5	0
El75NT	CHARN		05s	1-2	1
El75NU	NELESGS		10s	3-4	1
EL75NV	ESAXLOC		12a		1
EL75NX	ECHAF	ELAJ069	10s	3-4	0
EL75OJ	FE		07s	2	0
El75OK	SST		02s	2-4	1
EL75OM	ESMG		10s	3-4	1

Urn number	cname	Thin Section Number	Decorative Group	Cleatham Phase	Sign of Use
EL75OQ	NELESGS		09s	3-5	0
El75OR	ESMG		07n	1-2	1
EL75OT	ESMG		07b	1-4	1
EL75OV	CHARN		10s	3-4	0
EL75OXa	ESMG		10a	1	1
EL75PBa	ESAXLOC		01	1-5	0
EL75PF	NELESGS		09s	3-5	1
EL75PHa	SST		10s	3-4	1
EL75PO	ESMG		13n/16b	1	1
EL75PMb	ESMG	ELAJ040	07n	1-2	1
El75PMa	SSTCAC		10s	3-4	1
EL75OS	LIMES	ELAJ127	07n	1-2	1
EL75PN	NELESGS		10s	3-4	1
EL75PT	ESMG		10a	1	1
EL75PP	CHARN		13?		1
EL75QB	CHARN		05b	2	1
EL75QC	ESMG		01	1-5	1
EL75QF	ESMG		18s	4	1
EL75QG	SST		18a		1
El75QI	SST		07s or 13	2?	1
EL75QH	ESMG		07a	1	1
EL75QM	NELESGS		11s	5	1
EL75QY	CHARN		07s	2	1
EL75QN	ESMG		10s	3-4	1
El75QQ	SSTCAC		02n	?	1
EL75QR	CHARN		03s	1-3	0
EL75RB	ESAXLOC		13a		1
EL75RHa	SST		01	1-5	0
EL76AM	NELESGS		01	1-5	0
EL76AN	NELESGS	ELAJ117	06s	2	0
EL76AW	ESAXLOC		07n	1-2	1
EL76BF	ESMG		10s	3-4	0
EL76BK	CHARN		01b	1-5	1
EL76DP	NELESGS		10a	1?	1
EL76DR	SST		19q		1
EL76BL	SSTFEC		19b	1	1
EL76BTa	SST		18a		1
EL76BTe	NELESGS		01	1-5	0
El76BN	NELESGS		05b	2	1
EL76BPa	SSTFEC		10s	3-4	1
EL76BR	SST		05s	1-2	1
EL76CC	SST		10a	1	1
EL76CG	CHARN		01	1-5	1
EL76CL	ESAXLOC		07s	2	1
EL76CP	CHARN		10s	3-4	0
EL76CR	SST		07a	1-2	1
EL76CU	SST		10a	1	0
EL76DA	SSTCAC		10a	1	0
EL76DB	CHARN		09n	5	1

Elsham

Urn number	cname	Thin Section Number	Decorative Group	Cleatham Phase	Sign of Use
EL76DM	SST		05b	2	1
EL76DH	CHARN		10s	3-4	1
EL76DX	SSTCAC		01	1-5	1
El76DW	ESAXLOC		10s	3-4	1
El76EH	SST		01a	1-5	1
EL76FC	SST		10s	3-4	1
EL76EI	SST		01a	1-5	1
EL76ER	FE		03a	2	1
El76FE	ELCHARNLOC	ELAJ100	14a	1	1
EL76FS	ESMG		00		0
EL76GT	LIMES		01a	1-5	1
EL76GS	ESMG		13b	1-4	0
EL76HO	NELESGS		07s	2	0
EL76HQ	ESAXLOC		01b	1-5	0
EL76ID	NELESGS		?		0
EL76IJ	LIM		05a	1-2	1
EL76JH	NELESGS		12a		0
EL76IV	SSTCAC		10s	3-4	0
EL76JP	SSTCAC		01	1-5	1
EL76LSb	SST		02a	2-4	0
EL76MW	SST		07b	1-4	1
EL76MY	SST		07a	1	1
El76NA	SST		11q		1
EL76NB	SSTFEC		10s?	3-4?	1
EL76NEa	SSTFEC		07n	1-2	1
EL76NF	SST		10s	3-4	1
EL76NG	ELFEOL	ELAJ041	00b		1
El76NN	SST		22b		1
EL76PF	CHARN		02b	1	1
EL76NR	SST		01	1-5	0
El76NW	SSTFEC		06s	2	0
EL76OS	SST		04s	2	0
EL76OT	ESCMG	ELAJ124	17s	4-5	1
EL76PB	CHARN		07n	1-2	0
EL76PD	NELESGS		10s	3-4	1
EL76PQ	ESMG		05n	4	1
El76PR	ESMG		07n	1-2	0
El76PT	ESMG		08b	?	0
EL76PU	ESMG		10a	1	0
EL76PW	SST		10b/16b	1	1
EL76PY	NELESGS		13?		1
EL76PZ	ESMG		10s	3-4	0
EL76QA	NELESGS		18q		1
EL75DM	ESMG		10a	1	0
EL75GX	SST		13n	1	1
EL76HS	SST		07a	1	1
EL75CA	SST		00		0
EL75DBb	NELESGS		00s		0

Urn number	cname	Thin Section Number	Decorative Group	Cleatham Phase	Sign of Use
EL75HPb	ASSHQ		00s		1
EL76IG	CHARN		00		0
EL76MOb	SST		00a		0
EL76MT	SST		00		1
EL75CX	NELESGS		01	1-5	0
EL75IQ	MISC				0
EL75QTa	NELESGS		01p	3-5	0

Non-Funerary Find-Site Fabric Totals

Find Site Code	Fabric Cname	Sherd Count	Vessel Count	Sum of Weight	% of Find-Site Sherd Count	% of Find-Site Vessel Count
AKAA	LIMES	1	1	8	100.0%	100.0%
AKWW	SSTNL	1	1	33	100.0%	100.0%
BBAJ	ESGS	1	1	16	50.0%	50.0%
BBAJ	SST	1	1	9	50.0%	50.0%
BBAL	ESGSNL	1	1	12	20.0%	20.0%
BBAL	LIMES	2	2	26	40.0%	40.0%
BBAL	SST	1	1	5	20.0%	20.0%
BBAL	SSTFEC	1	1	11	20.0%	20.0%
BBAN	CHARN	1	1	13	33.3%	33.3%
BBAN	ESGSNL	1	1	12	33.3%	33.3%
BBAN	SST	1	1	9	33.3%	33.3%
BBNB	ECHAF	1	1	12	16.7%	16.7%
BBNB	ESAXLOC	1	1	5	16.7%	16.7%
BBNB	ESGS	1	1	45	16.7%	16.7%
BBNB	SSTCAC	3	3	53	50.0%	50.0%
BLAR	SST	1	1	16	100.0%	100.0%
BLBR	ECHAF	1	1	1	100.0%	100.0%
BLCA	SST	1	1	4	100.0%	100.0%
BNAM	ASSH	1	1	2	2.4%	2.4%
BNAM	CHARN	9	9	72	22.0%	22.0%
BNAM	ESAXLOC	7	7	32	17.1%	17.1%
BNAM	ESMG	1	1	21	2.4%	2.4%
BNAM	FE	2	2	16	4.9%	4.9%
BNAM	LIMES	2	2	7	4.9%	4.9%
BNAM	SST	16	16	133	39.0%	39.0%
BNAM	SSTCAC	1	1	3	2.4%	2.4%
BNAM	SSTMG	2	2	9	4.9%	4.9%
BNAS	SST	1	1	139	100.0%	100.0%
BNAX	ESAXLOC	1	1	13	50.0%	50.0%
BNAX	LIM	1	1	18	50.0%	50.0%
BNBE	ESAXLOC	7	1	22	100.0%	100.0%
BNPQ	IPS	1	1	2	33.3%	33.3%
BNPQ	ROM	2	2	13	66.7%	66.7%
BOAG	LIMES	2	2	50	100.0%	100.0%
BOBD	ESAXLOC	2	2	66	100.0%	100.0%
BSAA	CHARN	2	1	93	50.0%	50.0%
BSAA	SST	2	1	15	50.0%	50.0%
BSAD	ESAXLOC	1	1	11	50.0%	50.0%
BSAE	ASSH	1	1	2	50.0%	50.0%
BSAE	CHARN	23	21	301	19.8%	18.4%
BSAE	ECHAF	12	12	77	10.3%	10.5%
BSAE	ERRA	1	1	12	0.9%	0.9%
BSAE	ESAXLOC	41	41	557	35.3%	36.0%
BSAE	ESGS	5	5	47	4.3%	4.4%
BSAE	ESMG	1	1	5	0.9%	0.9%
BSAE	FE	2	2	7	1.7%	1.8%
BSAE	LIM	1	1	12	0.9%	0.9%
BSAE	LIMES	9	9	110	7.8%	7.9%
BSAE	NELESGS	1	1	23	0.9%	0.9%
BSAE	SST	9	9	85	7.8%	7.9%
BSAE	SSTMG	8	8	87	6.9%	7.0%
BSAE	SSTNL	3	3	22	2.6%	2.6%
CAAG	CHARN	5	5	56	7.4%	7.4%
CAAG	ECHAF	1	1		1.5%	1.5%
CAAG	ESAXLOC	6	6	90	8.8%	8.8%
CAAG	ESGS	1	1	13	1.5%	1.5%
CAAG	ESMG	22	22	337	32.4%	32.4%
CAAG	GROG	1	1	25	1.5%	1.5%
CAAG	LIM	1	1		1.5%	1.5%
CAAG	LIMES	1	1	8	1.5%	1.5%
CAAG	MAX	1	1	12	1.5%	1.5%
CAAG	MSAXLOC	1	1	13	1.5%	1.5%
CAAG	NELESGS	21	21	274	30.9%	30.9%

Non-Funerary Find-Site Fabric Totals

Find Site Code	Fabric Cname	Sherd Count	Vessel Count	Sum of Weight	% of Find-Site Sherd Count	% of Find-Site Vessel Count
CAAG	SST	3	3	27	4.4%	4.4%
CAAG	SSTFEC	3	3	38	4.4%	4.4%
CAAG	SSTMG	1	1	8	1.5%	1.5%
CRWA	ECHAF	1	1	4	2.4%	2.6%
CRWA	ERRA	1	1	5	2.4%	2.6%
CRWA	ESAXLOC	33	31	161	80.5%	79.5%
CRWA	SST	5	5	20	12.2%	12.8%
CRWA	SSTFEC	1	1	7	2.4%	2.6%
CRWB	ECHAF	1	1	2	2.3%	2.4%
CRWB	ERRA	1	1	4	2.3%	2.4%
CRWB	ESAXLOC	30	29	142	69.8%	69.0%
CRWB	ESGS	1	1	6	2.3%	2.4%
CRWB	ESMG	1	1	16	2.3%	2.4%
CRWB	SST	9	9	35	20.9%	21.4%
CRWE	ECHAF	8	8	24	26.7%	29.6%
CRWE	SST	22	19	181	73.3%	70.4%
CWBG	CHARN	2	2	16	28.6%	28.6%
CWBG	ECHAF	1	1	8	14.3%	14.3%
CWBG	ESGS	1	1	4	14.3%	14.3%
CWBG	ESMG	2	2	21	28.6%	28.6%
CWBG	SST	1	1	19	14.3%	14.3%
ELAI	ECHAF	1	1	8	100.0%	100.0%
ELAI	ESMG	1	1	13	100.0%	100.0%
ELAN	ESAXLOC	1	1	4	50.0%	50.0%
ELAN	NELESGS	1	1	5	50.0%	50.0%
ELBA	NELESGS	55	2	1039	98.2%	66.7%
ELBA	SST	1	1	91	1.8%	33.3%
ELBB	ASQSH	2	1	47	100.0%	100.0%
ELXX	ESAXLOC	1	1	14	33.3%	33.3%
ELXX	SST	2	2	23	66.7%	66.7%
FAXE	SST	1	1	4	1.3%	1.3%
FXAE	CHARN	35	35	183	43.8%	44.9%
FXAE	ECHAF	2	2	6	2.5%	2.6%
FXAE	ERRA	1	1	33	1.3%	1.3%
FXAE	ESAXLOC	4	4	11	5.0%	5.1%
FXAE	ESGS	4	4	18	5.0%	5.1%
FXAE	ESGSNL	1	1	6	1.3%	1.3%
FXAE	ESMG	10	9	54	12.5%	11.5%
FXAE	LIMES	5	5	10	6.3%	6.4%
FXAE	SST	17	16	143	21.3%	20.5%
FXAF	CHARN	1	1	4	100.0%	100.0%
GXBA	ESAXLOC	2	2	90	100.0%	100.0%
GXBC	CHARN	1	1	19	50.0%	50.0%
GXBC	SSTMG	1	1	16	50.0%	50.0%
HBBB	ESMG	1	1	2	100.0%	100.0%
HORJ	ASQSH	1	1		100.0%	100.0%
KLAT	ESAXLOC	1	1	3	50.0%	50.0%
KLAT	FE	1	1	2	50.0%	50.0%
KSWY	SST	1	1	20	100.0%	100.0%
MRBD	CHARN	28	26	258	19.3%	19.3%
MRBD	ECHAF	12	10	122	8.3%	7.4%
MRBD	ELCHARNLOC	1	1	21	0.7%	0.7%
MRBD	ESAXLOC	11	11	46	7.6%	8.1%
MRBD	ESMG	13	13	191	9.0%	9.6%
MRBD	FE	1	1	5	0.7%	0.7%
MRBD	LIMES	1	1	5	0.7%	0.7%
MRBD	NELESGS	11	11	75	7.6%	8.1%
MRBD	SST	41	41	342	28.3%	30.4%
MRBD	SSTCAC	26	20	367	17.9%	14.8%
MRBF	ASSH	1	1	4	6.7%	6.7%
MRBF	CHARN	1	1	4	6.7%	6.7%
MRBF	ELCHARNLOC	1	1	35	6.7%	6.7%
MRBF	ESAXLOC	3	3	13	20.0%	20.0%

Non-Funerary Find-Site Fabric Totals

Find Site Code	Fabric Cname	Sherd Count	Vessel Count	Sum of Weight	% of Find-Site Sherd Count	% of Find-Site Vessel Count
MRBF	ESGS	1	1	10	6.7%	6.7%
MRBF	ESMG	3	3	47	20.0%	20.0%
MRBF	FE	1	1	5	6.7%	6.7%
MRBF	SST	1	1	6	6.7%	6.7%
MRBF	SSTCAC	2	2	55	13.3%	13.3%
MRBF	SSTFEC	1	1	3	6.7%	6.7%
MRCF	FE	1	1	2	20.0%	50.0%
MRCF	SST	4	1	16	80.0%	50.0%
MRDB	FE	1	1	5	100.0%	100.0%
MSAB	ASQSH	1	1	4	0.2%	0.4%
MSAB	CHARN	1	1	6	0.2%	0.4%
MSAB	ECHAF	1	1	2	0.2%	0.4%
MSAB	ERRA	157	131	525	25.7%	50.2%
MSAB	ESAXLOC	34	33	128	5.6%	12.6%
MSAB	ESGS	17	13	91	2.8%	5.0%
MSAB	ESGSNL	2	2	3	0.3%	0.8%
MSAB	FE	260	13	935	42.5%	5.0%
MSAB	SST	119	51	329	19.4%	19.5%
MSAB	SSTMG	20	15	163	3.3%	5.7%
MSBV	ASSH	1	1	8	20.0%	20.0%
MSBV	FE	2	2	22	40.0%	40.0%
MSBV	LIMES	1	1	23	20.0%	20.0%
MSBV	SST	1	1	20	20.0%	20.0%
MSBW	ERRA	2	1	21	66.7%	50.0%
MSBW	SST	1	1	11	33.3%	50.0%
MSHB	FE	2	1	21	100.0%	100.0%
MSMB	FE	34	1	161	68.0%	33.3%
MSMB	SST	16	2	56	32.0%	66.7%
MTAS	LIMES	4	1	41	80.0%	50.0%
MTAS	SST	1	1	24	20.0%	50.0%
MTBV	ECHAF	3	3	13	27.3%	27.3%
MTBV	ESAXLOC	1	1	24	9.1%	9.1%
MTBV	ESGS	1	1	11	9.1%	9.1%
MTBV	LIM	1	1	5	9.1%	9.1%
MTBV	NELESGS	1	1	6	9.1%	9.1%
MTBV	SST	4	4	40	36.4%	36.4%
MTBX	CHARN	126	123	1583	24.9%	24.7%
MTBX	ECHAF	42	42	326	8.3%	8.4%
MTBX	ELCHARNLOC	1	1		0.2%	0.2%
MTBX	ERRA	1	1	11	0.2%	0.2%
MTBX	ESAXLOC	187	185	1964	36.9%	37.1%
MTBX	ESGSNL	1	1	14	0.2%	0.2%
MTBX	ESMG	12	11	108	2.4%	2.2%
MTBX	FE	40	40	317	7.9%	8.0%
MTBX	GROG	4	3	31	0.8%	0.6%
MTBX	NELESGS	4	4	26	0.8%	0.8%
MTBX	SST	74	73	732	14.6%	14.7%
MTBX	SSTCAC	6	5	22	1.2%	1.0%
MTBX	SSTFEC	2	2	7	0.4%	0.4%
MTBX	SSTMG	4	4	31	0.8%	0.8%
MTBX	SSTNL	3	3	12	0.6%	0.6%
MTCC	CHARN	1	1	3	7.7%	7.7%
MTCC	ECHAF	1	1	3	7.7%	7.7%
MTCC	ERRA	5	5	32	38.5%	38.5%
MTCC	ESAXLOC	4	4	33	30.8%	30.8%
MTCC	SST	2	2	7	15.4%	15.4%
MTCF	ECHAF	1	1	4	25.0%	25.0%
MTCF	ESAXLOC	2	2	5	50.0%	50.0%
MTCF	ESMG	1	1	2	25.0%	25.0%
MTCH	ECHAF	2	1	18	15.4%	9.1%
MTCH	ESAXLOC	5	5	62	38.5%	45.5%
MTCH	FE	5	4	22	38.5%	36.4%
MTCH	SST	1	1	3	7.7%	9.1%

Non-Funerary Find-Site Fabric Totals

Find Site Code	Fabric Cname	Sherd Count	Vessel Count	Sum of Weight	% of Find-Site Sherd Count	% of Find-Site Vessel Count
MTDB	ESAXLOC	2	2	24	66.7%	66.7%
MTDB	LIM	1	1	3	33.3%	33.3%
MTFW	CHARN	18	17	122	23.1%	22.4%
MTFW	ECHAF	9	9	58	11.5%	11.8%
MTFW	ERRA	3	3	21	3.8%	3.9%
MTFW	ESAXLOC	21	21	203	26.9%	27.6%
MTFW	FE	1	1	3	1.3%	1.3%
MTFW	LIM	1	1	4	1.3%	1.3%
MTFW	LIMES	2	2	28	2.6%	2.6%
MTFW	NELESGS	1	1	5	1.3%	1.3%
MTFW	SST	22	21	150	28.2%	27.6%
OS0003	ASSH	1	1	1	50.0%	50.0%
OS0003	ECHAF	1	1	10	50.0%	50.0%
OS0033	FE	1	1	6	50.0%	50.0%
OS0033	LIMES	1	1	5	50.0%	50.0%
OS0034	CHARN	2	2	24	50.0%	40.0%
OS0034	ERRA	2	2	7	50.0%	40.0%
OS0034	ESAXLOC	1	1	4	25.0%	20.0%
OS0093	ESAXLOC	1	1	2	33.3%	33.3%
OS0528	ESAXLOC	2	2	7	66.7%	66.7%
OS0528	ESGS	1	1	4	33.3%	33.3%
OS0528	SSTNL	1	1	4	33.3%	33.3%
OS1545	ESAXLOC	1	1	10	100.0%	100.0%
OS1752	ESAXLOC	1	1	7	100.0%	100.0%
OS2074	ESAXLOC	1	1	40	100.0%	100.0%
OS3000	ESAXLOC	4	4	14	80.0%	80.0%
OS3000	NELESGS	1	1	3	20.0%	20.0%
OS3137	ASSHQ	1	1	4	100.0%	100.0%
OS3400	ESAXLOC	1	1	4	50.0%	50.0%
OS3400	ESGS	1	1	3	50.0%	50.0%
OS4757	ESAXLOC	1	1	12	100.0%	100.0%
OS5500	CHARN	1	1	5	6.3%	6.3%
OS5500	ECHAF	1	1	4	6.3%	6.3%
OS5500	ERRA	4	4	37	25.0%	25.0%
OS5500	ESAXLOC	1	1	4	6.3%	6.3%
OS5500	ESGS	1	1	6	6.3%	6.3%
OS5500	FE	1	1	5	6.3%	6.3%
OS5500	LIMES	2	2	5	12.5%	12.5%
OS5500	SST	5	5	21	31.3%	31.3%
OS6223	ESAXLOC	1	1	2	50.0%	50.0%
OS6223	SSTMG	1	1	14	50.0%	50.0%
OS6500	CHARN	2	2	7	25.0%	25.0%
OS6500	ESAXLOC	1	1	3	12.5%	12.5%
OS6500	ESAXX	1	1	2	12.5%	12.5%
OS6500	ESGS	1	1	1	12.5%	12.5%
OS6500	SST	2	2	4	25.0%	25.0%
OS6500	SSTMG	1	1	3	12.5%	12.5%
OS6838	LIMES	1	1	5	100.0%	100.0%
OS7354	ASSHQ	2	2	5	33.3%	33.3%
OS7354	ESAXLOC	3	3	11	50.0%	50.0%
OS7354	ESGS	1	1	1	16.7%	16.7%
OS8500	CHARN	3	3	20	21.4%	21.4%
OS8500	ERRA	1	1	4	7.1%	7.1%
OS8500	ESAXLOC	4	4	30	28.6%	28.6%
OS8500	ESMG	1	1	3	7.1%	7.1%
OS8500	FE	1	1	23	7.1%	7.1%
OS8500	LIM	1	1	4	7.1%	7.1%
OS8500	NELESGS	2	2	24	14.3%	14.3%
OS8500	SST	1	1	2	7.1%	7.1%
OS9075	ASSHQ	1	1	4	100.0%	100.0%
OS9109	ASSHQ	1	1	2	33.3%	33.3%
OS9109	CHARN	1	1	3	33.3%	33.3%
OS9109	ESAXLOC	1	1	5	33.3%	33.3%

Non-Funerary Find-Site Fabric Totals

Find Site Code	Fabric Cname	Sherd Count	Vessel Count	Sum of Weight	% of Find-Site Sherd Count	% of Find-Site Vessel Count
RXSN	SSTMG	1	1	5	100.0%	100.0%
SNAC	CHARN	26	26	282	14.4%	14.9%
SNAC	ECHAF	24	23	209	13.3%	13.1%
SNAC	ELCHARNLOC	1	1	4	0.6%	0.6%
SNAC	ERRA	2	2	27	1.1%	1.1%
SNAC	ESAXLOC	39	38	429	21.5%	21.7%
SNAC	ESGS	4	4	13	2.2%	2.3%
SNAC	ESMG	1	1	7	0.6%	0.6%
SNAC	FE	26	26	315	14.4%	14.9%
SNAC	LIMES	4	4	35	2.2%	2.3%
SNAC	NELESGS	10	10	127	5.5%	5.7%
SNAC	SST	42	38	510	23.2%	21.7%
SNAC	SSTNL	2	2	22	1.1%	1.1%
TCBB	ASSH	1	1	40	50.0%	50.0%
TCBB	ECHAF	1	1	11	50.0%	50.0%
THAB	SST	1	1	37	100.0%	100.0%
THDD	SST	1	1	11	100.0%	100.0%
WGMCL	ESAXLOC	1	1	3	100.0%	100.0%
WORAC	ESAXLOC	11	11	78	84.6%	84.6%
WORAC	ESMG	1	1	4	7.7%	7.7%
WORAC	SST	1	1	13	7.7%	7.7%
WRAAI	ESAXLOC	1	1	3	100.0%	100.0%

Appendix D.2

Petrographic Group Database: Cleatham

Urn Number	cname	Thin Section Number	Petrographic Group	Sub-Group
847	ESMG	MT001	Cleatham Limestone Group	E
844	SSTCAC	MT002	Cleatham Calcareous Sandstone Group	Main
833	SSTCAC	MT003	Cleatham Limestone Group	E
575	SSTCAC	MT004	Cleatham Calcareous Sandstone Group	Main
1071	SSTCAC	MT005	Glacially Derived Sandstone Group	A
105	SSTFEC	MT006	Medium Sandstone Group	Main
693	SSTFEC	MT007	Cleatham Well Rounded Quartz and Chert Group	Main
563	ESAXLOC	MT008	Cleatham Dolerite Group	
207	SSTFEC	MT009	Cleatham Well Rounded Quartz and Chert Group	Main
195	SSTFEC	MT010	Medium Sandstone Group	C
115	SSTFEC	MT011	Cleatham Well Rounded Quartz and Chert Group	Main
327	SSTFEC	MT012	Very Coarse Grained Well Rounded Quartz and Chert Group	Main
320	SSTFEC	MT013	Oolitic Ironstone Group	
152	SSTFEC	MT014	Cleatham Well Rounded Quartz and Chert Group	Main
541	ASSH	MT015	Cleatham Limestone Group	C
987	ASSHQ	MT016	Cleatham Limestone Group	D
494	ASSHQ	MT017	Cleatham Limestone Group	Main
491	ASQSH	MT018	Cleatham Limestone Group	D
1055	ASQSH	MT019	Cleatham Limestone Group	Main
339	SSTMG	MT020	Cleatham Well Rounded Quartz and Chert Group	Main
835	SSTMG	MT021	Failed in Manufacture	
1030	ESGS	MT022	Cleatham Well Rounded Quartz and Chert Group	A
475	ESGS	MT023	Cleatham Calcareous Sandstone Group	Main
284	ESGS	MT024	Cleatham Well Rounded Quartz and Chert Group	Main
255	ESGS	MT025	Cleatham Granitic Group	Main
516	ESGS	MT026	Cleatham Limestone Group	Main
496	LIMES	MT027	Cleatham Limestone Group	G
1028	LIMES	MT028	Cleatham Limestone Group	Main
845	LIMES	MT029	Cleatham Limestone Group	H
685	LIMES	MT030	Cleatham Granitic Group	Main
225	LIMES	MT031	Failed in Manufacture	
465	LIMES	MT032	Cleatham Limestone Group	G
1038	LIMES	MT033	Cleatham Limestone Group	Main

Petrographic Group Database: Cleatham

Urn Number	cname	Thin Section Number	Petrographic Group	Sub-Group
88	LIM	MT034	Cleatham Oolitic Limestone Group	D
554	LIM	MT035	Cleatham Oolitic Limestone Group	Main
116	LIM	MT036	Cleatham Sands	C
261	LIM	MT037	Glacially Derived Sandstone Fabric Group	Main
294	LIM	MT038	Cleatham Oolitic Limestone Group	Main
709	LIM	MT039	Cleatham Oolitic Limestone Group	Main
1054	LIM	MT040	Cleatham Oolitic Limestone Group	C
389	LIM	MT041	Cleatham Sands	E
768	LIM	MT042	Cleatham Oolitic Limestone Group	Main
539	LIM	MT043	Cleatham Oolitic Limestone Group	Main
504	LIM	MT044	Cleatham Oolitic Limestone Group	Main
292	LIM	MT045	Cleatham Oolitic Limestone Group	Main
239	CHARN	MT046	Cleatham Granitic Group	A
593	CHARN	MT047	Two Mica Granite Group	C
447	CHARN	MT048	Two Mica Granite Group	Main
102	CHARN	MT049	Cleatham Granitic Group	Main
368	CHARN	MT050	Two Mica Granite Group	Main
446	CHARN	MT051	Two Mica Granite Group	A
235	CHARN	MT052	Cleatham Granitic Group	Main
305	CHARN	MT053	Cleatham Granitic Group	Main
523	CHARN	MT054	Cleatham Oolitic Limestone Group	Main
370	CHARN	MT055	Cleatham Granitic Group	Main
445	CHARN	MT056	Two Mica Granite Group	B
497	CHARN	MT057	Cleatham Granitic Group	Main
265	CHARN	MT058	Cleatham Granitic Group	B
828	R	MT059	Cleatham Limestone Group	C
809	R	MT060	Cleatham Limestone Group	H
649	R	MT061	Failed in Manufacture	
464	ELCHARNLOC	MT062	Cleatham Calcareous Sandstone Group	A
94	ERRA	MT063	Cleatham Granitic Group	C
943	ECHAF	MT064	Grog Group	Main
944	ESSPIL	MT065	Two Mica Granite Group	Main
394	ESSPIL	MT066	Cleatham Calcareous Sandstone Group	Main

Petrographic Group Database: Cleatham

Urn Number	cname	Thin Section Number	Petrographic Group	Sub-Group
354	NELESGS	MT067	Cleatham Well Rounded Quartz and Chert Group	B
141	NELESGS	MT068	Cleatham Well Rounded Quartz and Chert Group	Main
77	NELESGS	MT069	Very Coarse Grained Well Rounded Quartz and Chert Group	Main
312	ESAXLOC	MT070	Medium Sandstone Group	A
376	ESAXLOC	MT071	Grog Group	Main
533	ESAXLOC	MT072	Medium Sandstone Group	B
82	ESAXLOC	MT073	Failed in Manufacture	
441	ESAXLOC	MT074	Cleatham Sands	A
1051	ESAXLOC	MT075	Glacially Derived Sandstone Group	Main
232	ESAXLOC	MT076	Cleatham Ironstone Group	A
76	ESAXLOC	MT077	Glacially Derived Sandstone Group	Main
309	SSTNL	MT078	Medium Sandstone Group	A
588	SSTNL	MT079	Glacially Derived Sandstone Group	Main
836	SSTNL	MT080	Glacially Derived Sandstone Group	Main
87	SSTNL	MT081	Glacially Derived Sandstone Group	A
442	SSTNL	MT082	Cleatham Calcareous Sandstone Group	A
103	ESGSNL	MT083	Glacially Derived Sandstone Group	Main
337	ESGSNL	MT084	Cleatham Well Rounded Quartz and Chert Group	Main
581	ESGSNL	MT085	Calcarouse Sandstone and Coarse Well Rounded Quartz and Chert Group	
454	ESGSNL	MT086	Two Mica Granite Group	B
325	ESGSNL	MT087	Glacially Derived Sandstone Group	Main
125	ESMG	MT088	Cleatham Calcareous Sandstone Group	Main
219	ESMG	MT089	Calcarouse Sandstone and Coarse Well Rounded Quartz and Chert Group	
495	ESMG	MT090	Cleatham Calcareous Sandstone Group	B
488	ESMG	MT091	Cleatham Calcareous Sandstone Group	Main
492	ESMG	MT092	Calcarouse Sandstone and Coarse Well Rounded Quartz and Chert Group	
481	ESMG	MT093	Calcarouse Sandstone and Coarse Well Rounded Quartz and Chert Group	
568	ESMG	MT094	Cleatham Calcareous Sandstone Group	Main
1031	ESMG	MT095	Cleatham Sands	C
550	ESMG	MT096	Calcarouse Sandstone and Coarse Well Rounded Quartz and Chert Group	
95	FE	MT097	Cleatham Ironstone Group	B
544	FE	MT098	Cleatham Ironstone Group	A
190	FE	MT099	Cleatham Ironstone Group	Main

Petrographic Group Database: Cleatham

Urn Number	cname	Thin Section Number	Petrographic Group	Sub-Group
932	FE	MT100	Cleatham Ironstone Group	B
177	FE	MT101	Cleatham Ironstone Group	B
1020	FE	MT102	Glacially Derived Sandstone Group	Main
501	FE	MT103	Glacially Derived Sandstone Group	Main
577	FE	MT104	Cleatham Ironstone Group	A
142	FE	MT105	Cleatham Ironstone Group	A
690	FE	MT106	Cleatham Ironstone Group	Main
100	FE	MT107	Cleatham Ironstone Group	Main
1029	FE	MT108	Cleatham Ironstone Group	Main
839	FE	MT109	Cleatham Ironstone Group	A
119	FE	MT110	Cleatham Ironstone Group	Main
426	FE	MT111	Organics	B
161	FE	MT112	Cleatham Ironstone Group	Main
345	FE	MT113	Cleatham Ironstone Group	A
449	FE	MT114	Cleatham Ironstone Group	Main
772	FE	MT115	Cleatham Ironstone Group	A
10	FE	MT116	Cleatham Ironstone Group	C
414	FE	MT117	Cleatham Well Rounded Quartz and Chert Group	Main
427	FE	MT118	Cleatham Well Rounded Quartz and Chert Group	A
133	FE	MT119	Failed in Manufacture	
1045	FE	MT120	Cleatham Ironstone Group	Main
453	ECHAF	MT121	Grog Group	Main
1010	ECHAF	MT122	Organics	C
85	ECHAF	MT123	Organics	A
352	ECHAF	MT124	Organics	F
429	ECHAF	MT125	Organics	B
1018	ECHAF	MT126	Organics	Main
233	ECHAF	MT127	Organics	
431	ECHAF	MT128	Organics	A
535	ECHAF	MT129	Organics	Main
206	ECHAF	MT130	Organics	Main
234	ECHAF	MT131	Organics	B
498	SST	MT132	Cleatham Calcareous Sandstone Group	C

Petrographic Group Database: Cleatham

Urn Number	cname	Thin Section Number	Petrographic Group	Sub-Group
348	SST	MT133	Cleatham Sands	A
738	SST	MT134	Medium Sandstone Group	Main
466	SST	MT135	Grog Group	Main
1012	SST	MT136	Medium Sandstone Group	Main
458	SST	MT137	Failed in Manufacture	
297	FE	MT138	Cleatham Sands	D
42	SST	MT139	Granitic Sandstone Group	Main
279	SST	MT140	Glacially Derived Sandstone Group	Main
231	SST	MT141	Medium Sandstone Group	Main
841	SST	MT142	Cleatham Sands	C
1017	SST	MT143	Medium Sandstone Group	B
326	SST	MT144	Glacially Derived Sandstone Group	Main
1019	SST	MT145	Glacially Derived Sandstone Group	Main
201	SST	MT146	Glacially Derived Sandstone Group	A
769	SST	MT147	Glacially Derived Sandstone Group	Main
520	SST	MT148	Glacially Derived Sandstone Group	A
198	SST	MT149	Cleatham Ironstone Group	A
519	SST	MT150	Medium Sandstone Group	B
485	SST	MT151	Glacially Derived Sandstone Group	A
573	SST	MT152	Cleatham Calcareous Sandstone Group	Main
796	SST	MT153	Failed in Manufacture	
589	SST	MT154	Glacially Derived Sandstone Group	Main
493	SST	MT155	Glacially Derived Sandstone Group	Main
1024	SST	MT156	Medium Sandstone Group	Main
1023	SST	MT157	Glacially Derived Sandstone Group	Main
118	SST	MT158	Glacially Derived Sandstone Group	
602	SST	MT159	Cleatham Sands	A
878	SST	MT160	Glacially Derived Sandstone Group	Main
990	SST	MT161	Glacially Derived Sandstone Group	A
613	SST	MT162	Glacially Derived Sandstone Group	Main
854	SST	MT163	Medium Sandstone Group	C
642	SST	MT164	Glacially Derived Sandstone Group	A
611	SST	MT165	Medium Sandstone Group	A

Petrographic Group Database: Cleatham

Urn Number	cname	Thin Section Number	Petrographic Group	Sub-Group
801	SST	MT166	Glacially Derived Sandstone Group	Main
802	SST	MT167	Failed in Manufacture	
755	SST	MT168	Glacially Derived Sandstone Group	
786	SST	MT169	Glacially Derived Sandstone Group	A
1077	SST	MT170	Glacially Derived Sandstone Group	A
684	SST	MT171	Cleatham Sands	C
928	ESAXX	MT172	Grog Group	Main
1063	ESAXX	MT173	Failed in Manufacture	
961	R	MT174	Failed in Manufacture	
702	R	MT175	Failed in Manufacture	
852	ESSPIL	MT176	Failed in Manufacture	
821	SSTNL	MT177	Two Mica Granite Group	A
916	SSTFEC	MT178	Cleatham Sands	C
917	NELESGS	MT179	Cleatham Sands	B
923	NELESGS	MT180	Failed in Manufacture	
976	SST	MT181	Cleatham Sands	A
893	ESMG	MT182	Cleatham Well Rounded Quartz and Chert Group	Main
909	CHARN	MT183	Cleatham Granitic Group	Main
911	CHARN	MT184	Cleatham Granitic Group	A
373	ESAXLOC	MT185	Cleatham Sands	D
673	ESAXLOC	MT186	Failed in Manufacture	
210	ESAXLOC	MT187	Cleatham Sands	A
678	ESAXLOC	MT188	Cleatham Sands	C
682	ESAXLOC	MT189	Medium Sandstone Group	A
625	ESAXLOC	MT190	Glacially Derived Sandstone Group	A
667	ASSH	MT191	Cleatham Limestone Group	C
527	ECHAF	MT192	Organics	Main
859	ECHAF	MT193	Organics	A
780	ECHAF	MT194	Organics	Main
1074	ECHAF	MT195	Organics	A
855	ECHAF	MT196	Organics	A
988	ECHAF	MT197	Organics	E

Petrographic Group Database: Cleatham

Urn number	Full Find Number	cname	Thin Section Number	Petrographic Group	Sub-Group
EL76LJ	508	SSTCAC	ELAJ001	Calcarouse Sandstone Group	
EL76ITa	472a	SSTCAC	ELAJ002	Calcarouse Sandstone Group	
EL75MO	223	ESMG	ELAJ003	Calcarouse Sandstone and Coarse Well Rounded Quartz and Chert Group	
EL75MP	224	ESMG	ELAJ004	Calcarouse Sandstone and Coarse Well Rounded Quartz and Chert Group	
EL75LI	206	ESMG	ELAJ005	Calcarouse Sandstone and Coarse Well Rounded Quartz and Chert Group	
EL75GS	115	ESMG	ELAJ006	Elsham Granitic Group	Main
EL75PHb	270b	ESMG	ELAJ007	Calcarouse Sandstone and Coarse Well Rounded Quartz and Chert Group	
EL76FG	399	ESMG	ELAJ008	Calcarouse Sandstone and Coarse Well Rounded Quartz and Chert Group	
EL75MJ	219	ESMG	ELAJ009	Calcarouse Sandstone and Coarse Well Rounded Quartz and Chert Group	
EL75PLb	272b	NELESGS	ELAJ010	Very Coarse Grained Well Rounded Quartz and Chert Group	Main
EL75PHd	270d	NELESGS	ELAJ011	Very Coarse Grained Well Rounded Quartz and Chert Group	Main
EL75RAb	306b	NELESGS	ELAJ012	Failed in Manufacutre	
EL76DK	385	NELESGS	ELAJ013	Very Coarse Grained Well Rounded Quartz and Chert Group	Main
EL76FI	416	NELESGS	ELAJ014	Oolitic Ironstone Group	
EL75PHc	270c	NELESGS	ELAJ015	Very Coarse Grained Well Rounded Quartz and Chert Group	A
EL76LH	506	NELESGS	ELAJ016	Very Coarse Grained Well Rounded Quartz and Chert Group	A
EL76KI	494	NELESGS	ELAJ017	Very Coarse Grained Well Rounded Quartz and Chert Group	Main
EL76NWa	558a	NELESGS	ELAJ018	Very Coarse Grained Well Rounded Quartz and Chert Group	Main
EL76IM	468	ESCMG	ELAJ019	Elsham Sand Group	
EL76LI	507	ESCMG	ELAJ020	Elsham Sand Group	
EL76OW	571	SSTFEC	ELAJ021	Elsham Glacial Sands - Sandstone Group	B
EL76BJ	339	SSTFEC	ELAJ022	Elsham Glacial Sands - Sandstone Group	A
EL76KSb	500b	SSTFEC	ELAJ023	Very Coarse Grained Well Rounded Quartz and Chert Group	Main
EL75BOa	25a	SSTFEC	ELAJ024	Elsham Sand Group	
EL75GZ	121	SSTFEC	ELAJ025	Elsham Sand Group	
EL75EL	78	LIM	ELAJ026	Very Coarse Grained Well Rounded Quartz and Chert Group	C
EL76OP	564	LIM	ELAJ027	Cleatha Oolitic Limestone group	Main
EL76FN	421	LIM	ELAJ028	Cleatha Oolitic Limestone group	Main
EL76NP	551	LIM	ELAJ029	Cleatha Oolitic Limestone group	Main
EL76LN	510	ESMGFE	ELAJ030	Oolitic Ironstone Group	
EL75EP	76	ESMG	ELAJ031	Calcarouse Sandstone and Coarse Well Rounded Quartz and Chert Group	
EL75GL	108	ESMGFE	ELAJ032	Calcarouse Sandstone and Coarse Well Rounded Quartz and Chert Group	
EL76NX	559	LIMES	ELAJ033	Cleatha Oolitic Limestone group	B
EL76CAa	355a	LIMES	ELAJ034	Elsham Limestone Group	
EL75AX	17	LIMES	ELAJ035	Cleatha Oolitic Limestone group	Main
EL75KN	190	LIMES	ELAJ036	Very Coarse Grained Well Rounded Quartz and Chert Group	C
EL75CB	40	ESMG	ELAJ037	Failed in Manufacutre	
EL75AQ	9	ESMG	ELAJ038	Failed in Manufacutre	

EL75ML	221	ESMG	ELAJ039	Calcarouse Sandstone and Coarse Well Rounded Quartz and Chert Group	
EL75PMb	273b	ESMG	ELAJ040	Failed in Manufacutre	
EL76NG	542	ELFEOL	ELAJ041	Oolitic Ironstone Group	
El76HE	449	ELQFE	ELAJ042	Oolitic Ironstone Group	
EL76LY	517	ELQFE	ELAJ043	Oolitic Ironstone Group	
EL75DI	55	ELQFE	ELAJ044	Oolitic Ironstone Group	
			ELAJ045	Elsham Glacial Sands - Sandstone Group	Main
EL75HQ	134	NELESGS	ELAJ046	Elsham Sand Group	
EL76GP	436	ESAXLOC	ELAJ047	Calcarouse Sandstone Group	
EL76DUc	384c	ESAXLOC	ELAJ048	Elsham Glacial Sands - Sandstone Group	Main
EL75GAa	101a	ESAXLOC	ELAJ049	Very Coarse Grained Well Rounded Quartz and Chert Group	C
EL76HP	448	ESAXLOC	ELAJ050	Grog Group	
EL76NY	560	ESAXLOC	ELAJ051	Failed in Manufacutre	
EL76EK	409	ESAXLOC	ELAJ052	Elsham Sand Group	
EL75MI	218	ESAXLOC	ELAJ053	Elsham Sand Group	
EL76DC	373	CHARN	ELAJ054	Elsham Granitic Group	Main
EL76IC	460	CHARN	ELAJ055	Elsham Glacial Sands - Sandstone Group	A
EL75KXc	200c	CHARN	ELAJ056	Elsham Glacial Sands - Sandstone Group	A
EL75HH	126	CHARN	ELAJ057	Elsham Granitic Group	D
EL76CTc	372c	CHARN	ELAJ058	Elsham Glacial Sands - Sandstone Group	Main
EL75HEa	123a	CHARN	ELAJ059	Elsham Granitic Group	Main
EL76CH	353	CHARN	ELAJ060	Elsham Granitic Group	Main
EL76LOa	511a	CHARN	ELAJ061	Elsham Granitic Group	Main
EL75PQc	276c	ELCHARNL(	ELAJ062	Elsham Granitic Group	B
EL75HK	129	CHARN	ELAJ063	Elsham Granitic Group	Main
EL76CTa	372a	CHARN	ELAJ064	Elsham Granitic Group	Main
EL76PA	575	CHARN	ELAJ065	Elsham Granitic Group	Main
EL75KT	196	ECHAF	ELAJ066	Failed in Manufacutre	
EL75HJ	128	ECHAF	ELAJ067	Failed in Manufacutre	
EL75BV	31	ECHAF	ELAJ068	Organics	D
EL75NX	243	ECHAF	ELAJ069	Organics	Main
EL76NM	548	SST	ELAJ070	Two-Mica Granite Group	Main
EL75CE	37	SST	ELAJ071	Elsham Glacial Sands - Sandstone Group	A
EL75CD	35	SST	ELAJ072	Elsham Glacial Sands - Sandstone Group	A
EL75KM	189	SST	ELAJ073	Elsham Glacial Sands - Sandstone Group	Main
EL75JS	175	SST	ELAJ074	Elsham Glacial Sands - Sandstone Group	Main
EL76KSa	500a	SST	ELAJ075	Elsham Glacial Sands - Sandstone Group	Main
EL76EF	396	SST	ELAJ076	Calcarouse Sandstone Group	
EL75BOb	25b	SST	ELAJ077	Failed in Manufacutre	

EL76KE	490	SST	ELAJ078	Elsham Glacial Sands - Sandstone Group	A
EL76LZ	518	SST	ELAJ079	Elsham Glacial Sands - Sandstone Group	Main
EL76OU	569	SST	ELAJ080	Elsham Granitic Group	Main
EL75BX	33	SST	ELAJ081	Elsham Glacial Sands - Sandstone Group	A
EL76ON	562	SST	ELAJ082	Elsham Glacial Sands - Sandstone Group	Main
EL76CTd	372d	SST	ELAJ083	Failed in Manufacutre	
EL75KJ	188	SST	ELAJ084	Elsham Glacial Sands - Sandstone Group	B
EL76NV	557	SST	ELAJ085	Glacially Derive Sandstone Group	Main
EL76JC	476	FE	ELAJ086	Cleatham Ironstone Group	C
EL76FL	419	FE	ELAJ087	Cleatham Ironstone Group	D
EL75DN	63	FE	ELAJ088	Organics	D
EL76CS	365	FE	ELAJ089	Medium Sandstone Group	A
EL76GI	433	FE	ELAJ090	Failed in Manufacutre	
EL75QK	291	FE	ELAJ091	Cleatham Ironstone Group	D
EL75BQb	21b	FE	ELAJ092	Oolitic Ironstone Group	
EL75GC	102	FE	ELAJ093	Cleatham Ironstone Group	D
EL76FH	415	ERRA	ELAJ094	Elsham Glacial Sands - Sandstone Group	A
EL76KR	499	ERRA	ELAJ095	Elsham Granitic Group	Main
EL75KVa	198a	ELCHARNL(	ELAJ096	Failed in Manufacutre	
EL75KVb	198b	ELCHARNL(	ELAJ097	Elsham Granitic Group	C
EL75GG	103	ELCHARNL(	ELAJ098	Elsham Granitic Group	Main
EL75IS	159	ELCHARNL(	ELAJ099	Elsham Granitic Group	A
El76FE	411	ELCHARNL(	ELAJ100	Calcarouse Sandstone Group	
EL75NC	231	ELCHARNL(	ELAJ101	Elsham Granitic Group	Main
EL75JVa	178a	ASSHQ	ELAJ102	Elsham Glacial Sands - Sandstone Group	B
EL75HG	125	ASQSH	ELAJ103	Cleatham Limestone Group	Main
EL76DUa	384a	ASSHQ	ELAJ104	Cleatham Limestone Group	B
EL76FU	426	ASSHQ	ELAJ105	Very Coarse Grained Well Rounded Quartz and Chert Group	C
EL76MQ	526	SSTFEC	ELAJ106	Organics	B
EL76DJ	378	SSTFEC	ELAJ107	Calcarouse Sandstone and Coarse Well Rounded Quartz and Chert Group	
EL76NCa	538a	SSTFEC	ELAJ108	Very Coarse Grained Well Rounded Quartz and Chert Group	Main
EL76AXa	332a	SSTFEC	ELAJ109	Elsham Glacial Sands - Sandstone Group	Main
EL75CS	46	SSTFEC	ELAJ110	Elsham Glacial Sands - Sandstone Group	Main
EL76NEb	540b	SSTFEC	ELAJ111	Medium Sandstone Group	B
EL76NCb	538b	SSTFEC	ELAJ112	Elsham Glacial Sands - Sandstone Group	Main
EL76DL	377	NELESGS	ELAJ113	Failed in Manufacutre	
EL75AN	6	NELESGS	ELAJ114	Very Coarse Grained Well Rounded Quartz and Chert Group	A
EL75BBa	13a	SSTFEC	ELAJ115	Very Coarse Grained Well Rounded Quartz and Chert Group	B
EL75GF	104	NELESGS	ELAJ116	Very Coarse Grained Well Rounded Quartz and Chert Group	Main

EL76AN	330	NELESGS	ELAJ117	Oolitic Ironstone Group	
EL75HP	131	NELESGS	ELAJ118	Oolitic Ironstone Group	
EL76HF	451	SSTFEC	ELAJ118	Oolitic Ironstone Group	
EL75HL	130	NELESGS	ELAJ119	Very Coarse Grained Well Rounded Quartz and Chert Group	Main
EL75BBb	13b	NELESGS	ELAJ120	Very Coarse Grained Well Rounded Quartz and Chert Group	B
EL75BL	23	ESMG	ELAJ121	Calcarouse Sandstone and Coarse Well Rounded Quartz and Chert Group	
EL75QD	284	ESMG	ELAJ122	Calcarouse Sandstone and Coarse Well Rounded Quartz and Chert Group	
EL75QJ	293	ESCMG	ELAJ123	Failed in Manufacutre	
EL76OT	568	ESCMG	ELAJ124	Elsham Granitic Group	D
EL75DJa	54a	SSTMG	ELAJ125	Very Coarse Grained Well Rounded Quartz and Chert Group	Main
EL75AS	11	SSTMG	ELAJ126	Elsham Glacial Sands - Sandstone Group	A
EL75OS	257	LIMES	ELAJ127	Elsham Limestone Group	
EL75AP	8	LIMES	ELAJ128	Cleatha Oolitic Limestone group	B
EL75KXb	200b	SSTCAC	ELAJ129	Calcarouse Sandstone Group	
EL76AVb	331b	SSTCAC	ELAJ130	Calcarouse Sandstone Group	
EL75KXa	200a	NELESGS	ELAJ131	Elsham Glacial Sands - Sandstone Group	Main
EL75PW	281	SSTCAC	ELAJ132	Failed in Manufacutre	

Petrographic Group Database: Non-Funerary Find-Sites

Site_Code	Cname	Thin Section Number	Petrographic Group	Sub-Group
AKWW	SSTNL	GP001	Granitic Sandstone Group	
BBAJ	ESGS	GP002	Cleatham Sands	A
BBAL	SST	GP003	Cleatham Dolerite Group	
BBAL	SSTFEC	GP004	Glacially Derived Sandtone Group	Main
BBAN	CHARN	GP005	Failed in Manufacture	
BNAM	SSTCAC	GP006	Calcarouse Sandstone and Coarse Well Rounded Quartz and Chert Group	
BNAM	SST	GP007	Failed in Manufacture	
BNAM	CHARN	GP008	Cleatham Granitic Group	B
BNAM	LIMES	GP009	Elsham Limestone Group	
BNAM	FE	GP010	Cleatham Granitic Group	Main
BNAM	ESAXLOC	GP011	Cleatham Well Rounded Quartz and Chert Group	A
BNAM	CHARN	GP012	Cleatham Granitic Group	Main
BNAX	LIM	GP013	Cleatham Oolitic Limestone Group	Main
BOBD	ESAXLOC	GP014	Failed in Manufacture	
BSAA	SST	GP015	Organics	A
CWBG	ESGS	GP016	Cleatham Well Rounded Quartz and Chert Group	A
CWBG	CHARN	GP017	Cleatham Granitic Group	Main
CWBG	ECHAF	GP018	Organics	A
CWBG	ESMG	GP019	Cleatham Sands	G
CWBG	SST	GP020	Cleatham Ironstone Group	Main
HBBB	ESMG	GP021	Cleatham Calcarous Sandstone Group	B
MRBF	FE	GP022	Cleatham Ironstone Group	Main
MRBF	ESAXLOC	GP023	Cleatham Well Rounded Quartz and Chert Group	Main
MRBF	ESMG	GP024	Calcarouse Sandstone and Coarse Well Rounded Quartz and Chert Group	
MRBF	SSTCAC	GP025	Calcarouse Sandstone and Coarse Well Rounded Quartz and Chert Group	
MRBF	ELCHARNLOC	GP026	Glacially Derived Sandtone Group	Main
MRBD	SSTCAC	GP027	Medium Sandstone Group	Main
MRBD	SSTCAC	GP028	Calcarouse Sandstone Group	
MRBD	CHARN	GP029	Cleatham Granitic Group	B
MRBD	CHARN	GP030	Cleatham Granitic Group	Main
MRBD	ELCHARNLOC	GP031	Two-Mica Granite Group	B
MRBD	ESMG	GP032	Calcarouse Sandstone Group	

MRBD	ESMG	GP033	Calcarouse Sandstone and Coarse Well Rounded Quartz and Chert Group	
MRBD	ECHAF	GP034	Organics	A
MRBD	ECHAF	GP035	Cleatham Sands	C
MRBD	LIMES	GP036	Cleatham Oolitic Limestone Group	A
MRBD	SST	GP037	Two-Mica Granite Group	Main
MRBD	SST	GP038	Glacially Derived Sandtone Group	Main
MRBD	NELESGS	GP039	Very Coarse Grained Well Rounded Quartz and Chert Group	Main
MRBD	NELESGS	GP040	Very Coarse Grained Well Rounded Quartz and Chert Group	Main
BSAE	LIM	GP041	Cleatham Oolitic Limestone Group	A
BSAE	ESGS	GP042	Oolitic Ironstone Group	
BSAE	ECHAF	GP043	Organics	A
BSAE	ECHAF	GP044	Organics	C
BSAE	CHARN	GP045	Cleatham Sands	B
BSAE	CHARN	GP046	Failed in Manufacture	
BSAE	LIMES	GP047	Cleatham Limestone Group	B
BSAE	LIMES	GP048	Cleatham Limestone Group	B
MSBV	FE	GP049	Medium Sandstone Group	Main
MTBV	SST	GP050	Granitic Sandstone Group	
MTBV	ECHAF	GP051	Organics	Main
MTBV	ESAXLOC	GP052	Cleatham Sands	Main
KLAT	FE	GP053	Cleatham Sands	E
MTCC	ESAXLOC	GP054	Cleatham Sands	Main
MTCC	ECHAF	GP055	Cleatham Sands	B
MTCC	SST	GP056	Medium Sandstone Group	A
FXAE	CHARN	GP057	Cleatham Granitic Group	Main
FXAE	CHARN	GP058	Cleatham Granitic Group	A
FXAE	ESMG	GP059	Cleatham Sands	F
FXAE	SST	GP060	Medium Sandstone Group	A
FXAE	SST	GP061	Glacially Derived Sandtone Group	Main
CRWB	ESAXLOC	GP062	Failed in Manufacture	
CRWE	ECHAF	GP063	Cleatham Sands	Main
CRWA	SSTFEC	GP064	Cleatham Sands	A
CRWA	ERRA	GP065	Failed in Manufacture	

CRWA	ESAXLOC	GP066	Cleatham Sands	Main
CRWE	SST	GP067	Failed in Manufacture	
CRWB	SST	GP068	Cleatham Sands	Main
WORAC	ESMG	GP069	Calcarouse Sandstone Group	
TCBB	ECHAF	GP070	Cleatham Sands	B
MSAB	SST	GP071	Medium Sandstone Group	A
MSAB	ESGS	GP072	Two-Mica Granite Group	Main
MSAB	ERRA	GP073	Glacially Derived Sandstone Group	Main
MSAB	FE	GP074	Cleatham Granitic Group	Main
MSAB	ECHAF	GP075	Organics	Main
MSAB	SST	GP076	Cleatham Sands	Main
MSAB	ERRA	GP077	Cleatham Granitic Group	A
MTBX	ESAXLOC	GP078	Glacially Derived Sandstone Group	Main
MTBX	ECHAF	GP079	Organics	Main
MTBX	ESAXLOC	GP080	Cleatham Sands	Main
MTBX	CHARN	GP081	Cleatham Granitic Group	Main
MTBX	CHARN	GP082	Glacially Derived Sandstone Group	Main
MTBX	SST	GP083	Failed in Manufacture	
MTBX	FE	GP084	Cleatham Ironstone Group	Main
MTBX	FE	GP085	Cleatham Ironstone Group	Main
MTBX	SST	GP086	Glacially Derived Sandstone Group	Main
MTBX	NELESGS	GP087	Very Coarse Grained Well Rounded Quartz and Chert Group	Main
MTBX	ESMG	GP088	Calcarouse Sandstone Group	
MTBX	ECHAF	GP089	Organics	A
MTBX	SSTCAC	GP090	Cleatham Sands	A
MTBX	ECHAF	GP091	Cleatham Ironstone Group	Main
MTBX	SSTMG	GP092	Glacially Derived Sandstone Group	A
SNAC	NELESGS	GP093	Very Coarse Grained Well Rounded Quartz and Chert Group	Main
SNAC	FE	GP094	Cleatham Ironstone Group	Main
SNAC	ECHAF	GP095	Organics	B
SNAC	LIMES	GP096	Grog Group	A
SNAC	ECHAF	GP097	Cleatham Ironstone Group	Main
SNAC	CHARN	GP098	Cleatham Granitic Group	A

SNAC	CHARN	GP099	Cleatham Granitic Group	D
MTFW	CHARN	GP100	Cleatham Granitic Group	Main
MTFW	ESAXLOC	GP101	Failed in Manufacture	
MTFW	SST	GP102	Glacially Derived Sandstone Group	Main
MTFW	ECHAF	GP103	Organics	C
OS8500	LIM	GP104	Cleatham Oolitic Limestone Group	Main
OS8500	NELESGS	GP105	Cleatham Well Rounded Quartz and Chert Group	Main
OS8500	CHARN	GP106	Cleatham Granitic Group	Main
OS2074	ESAXLOC	GP107	Cleatham Granitic Group	A
OS6223	SSTMG	GP108	Glacially Derived Sandstone Group	Main
OS0034	CHARN	GP109	Cleatham Granitic Group	A
OS0034	CHARN	GP110	Cleatham Granitic Group	A
BNAS	SST	GP111	Glacially Derived Sandstone Group	Main
WHA	SSTNL	WHA01	Failed in Manufacture	
WHA	SSTNL	WHA02	Cleatham Dolerite Group	
WHA	SSTNL	WHA03	Cleatham Limestone Group	Main
WHA	SSTNL	WHA04	Cleatham Sands	C
WHA	SSTNL	WHA05	Cleatham Granitic Group	A
WHA	SSTNL	WHA06	Cleatham Limestone Group	Main
WHA	ESGSNL	WHA07	Cleatham Limestone Group	Main
WHA	ESGSNL	WHA08	Cleatham Calcarous Sandstone Group	Main
WHA	ESGSNL	WHA09	Cleatham Calcarous Sandstone Group	Main
WHA	ESGSNL	WHA10	Cleatham Granitic Group	Main
WHA	ESGSNL	WHA11	Cleatham Limestone Group	Main
WHA	ESGSNL	WHA12	Cleatham Calcarous Sandstone Group	Main
WHA	LIM	WHA13	Cleatham Oolitic Limestone Group	Main
WHA	LIM	WHA14	Cleatham Oolitic Limestone Group	Main
WHA	LIM	WHA15	Cleatham Oolitic Limestone Group	Main
WHA	LIM	WHA16	Cleatham Limestone Group	Main
WHA	LIMES	WHA17	Cleatham Limestone Group	A
WHA	LIMES	WHA18	Cleatham Limestone Group	A
WHA	LIMES	WHA19	Cleatham Limestone Group	A

Fabric Group Name:	**Calcareous Sandstone and Coarse Well Rounded Quartz and Chert**
Samples:	ELAJ003, ELAJ004, ELAJ005, ELAJ007, ELAJ008, ELAJ009, ELAJ031, ELAJ032, ELAJ039, ELAJ107, ELAJ121, ELAJ122, MT085, MT089, MT091, MT092, MT093, MT096, GP006, GP024, GP025, GP033
Sub Groups:	
Cemetery-cemetery	
Cemetery-settlement	GP033 = ELAJ122 MT085 = ELAJ009
Settlement-settlement	GP006=GP025

I Microstructure: 60-70%

a) Voids	Predominantly macro- and mega-planar voids and mega vughs. Also includes mega-vesicles, some of rhombic shape, probably deriving from leached calcareous materials. Voids have carbonised haloes indicating burnt out organics
b) C/f related distribution	Closed to open spaced
c) Preferred orientation	Planar voids aligned parallel to vessel walls. Coarse faction weakly aligned although moderately well developed in ELAJ122 with elongated grains and voids aligned with vessel walls. Coarse fraction of ELAJ09 shows preferred orientation of relic coils.

II Groundmass:

a) Homogeneity	Moderately heterogeneous to homogenous. Inhomogeneity related to the uneven distribution of calcareous sandstone fragments throughout the fabric.

b) Micromass (material less than 0.01mm)

(i) Optical state	Highly optically active (ELAJ121) to slightly optically active (ELAJ03)
(ii) birefringent fabric	Randomly striated b-fabric

(iii) colour

x40 in ppl:	Orange-brown
x40 in xp:	Brown-red

c) Inclusions:

i) c:f ratios

c:f:v $_{0.01}$	c.90:5:5 to c.85:10:5
Coarse fraction:	Medium sand to granules (0.25 to 2.7mm)
Fine fraction:	Fine sand and below (0.25 to 0.01mm)
ii) texture	At first appears to be a bimodal grain size distribution but this due to the poor sorting of the calcareous sandstone added as temper. Medium fraction el. and eq. sa-wr, <0.5mm mode 0.4mm. Very coarse-granular fraction eq. and el. sr-wr, <2.6mm, mode 1.0mm

iii) composition

Coarse Fraction (0.25mm to 2.7mm)

Frequent:	**Quartz;** el. and eq. sa-sr, <0.6mm, mode 0.25mm. The majority of grains show undulose extinction. Vacuoles, micro-fractures and some iron staining in cracks, rutile and zircon?
Common:	**Calcareous sandstone;** el. and eq, a-sa, <2.0mm, mode 1.00mm. Fragments range from single grains with micritic cement adhering to the surface, to c.2.0mm fragments composed of poorly sorted el. and eq, medium sand to very coarse/granules of sa-r quartz, chert and rarely medium sand sized microcline feldspar (seen in ELAJ08, GP033

	and ELAJ09) and polycrystalline quartz (ELAJ04) in a micritic calcite cement. This should probably be described as a poorly sorted medium to very coarse grained lithic greywacke.
	Calcite crystals and micrite*;* el and eq. sr-a, <0.5mm, mode 0.4mm. Well formed rhombic to anhedral crystals of calcite and sr-sa grains of micrite. Both clearly derive from the calcareous sandstone.
Few:	**Quartz**; eq, r-wr, <2.5mm mode 0.9mm. The majority of grains show undulose extinction, some possess vacuoles, zircon, rutile and micro-fractures, also iron staining is noted in cracks.
Very Few:	**Opaques***;* el and eq, sa-sr, <0.4mm mode 0.25mm. These occur only in ELAJo32. The clay in this sample is highly ferruginous and appears brown-black in xp (x40).
Few to Rare:	**Chert;** *el and eq.* r-wr, <2.5mm mode 0.9mm. Frequently chalcedonic. Calcite adhering to the surface of a grains demonstrates that they derive from the calcareous sandstone.
Very Rare to Absent:	**Amphibole**: subhedral el. 0.4mm (ELAJ09), anhedral eq. 0.1mm (ELAJ107)
	Microcline feldspar; eq, <0.4mm mode 0.25mm (ELAJ03, ELAJ32, ELAJ107, GP33)
	Calcite peloids; eq. r, <1.0mm, mode 0.75mm (in ELAJ07, ELAJ08, and ELAJ09). In ELAJ08 they can be seen to derive from the calcareous sandstone.
	Plutonic Igneous: el, sr, <2.5mm. In MT085 only. Composed of plagioclase feldspars altering to white mica, orthoclase feldspar, amphibole and quartz. These were clearly part of the parent boulder clay.
	Sandstone: <2.5mm, a, eq, composed of sa-sr quartz and orthoclase feldspar in a kaolinite cement.
	Glauconite: <0.5mm, eq, r
	Iron ooliths: <0.5mm, opaque, rarely showing concentric lamination.
	Kaolinte: 0.4mm. sr, eq, grain disaggregated from the sandstone in ELAJ107

Fine Fraction (0.25mm and below)

Frequent	**Quartz:** el and eq, sr-sa, <0.10mm, mode 0.08mm
	Mica: probably muscovite and chlorite

III Textural concentration features:

a) Tcf%: <1% void free.

b) Note: Red-brown, sharp to merging boundaries, rounded, equant, neutral optical density, concordant. Same fine fraction as above (GP033).

Comments

This is an homogenous group, characterised by the presence of a poorly sorted medium to very coarse/granular calcareous sandstone and in particular the large granular, up to 2.5mm, rounded to well rounded chert and quartz that derives from it. The angularity of the disaggregated calcareous grains, and these alongside poorly sorted fragments of the sandstone, demonstrates that the potters were crushing the sandstone and adding it to the clay as temper. The potters formed these vessels by coiling – that is by joining successive rings, or coils of clay, one on top of the other. This is demonstrated by sample ELAJ009 in which the preferred orientation of the coarse fraction reveals the relic coil and MT085, in which poor sorting mixing of the temper reveals an un-tempered coil on one side of the coil join and one well tempered coil on the other side. The optical activity of the groundmass in these samples demonstrates that the potters were not firing their vessels to very high temperatures, certainly no higher than c.850^{o}C, and the presence of carbonised organic material in the voids of ELAJ122 demonstrates that the vessels were not fired for a sufficient time to allow the organic material to fully burn out (Reedy 2008, 185-6; Tite 1995; Hodges 1963).

Potential sources for the raw material for this likely to be the Spilsby Sandstone. Gaunt *et al.* (1992, 69) and Wilson (1971, 55) have described the composition of the Spilsby Sandstone. In thin section the Spilsby sandstone is composed of sub-angular, medium sized grains. Some contain minute inclusions of black dust, irregularly or in streaks; others include zircon, chlorite, tourmaline and rutile. The sandstone also includes chert, chalcedony and feldspar. Given the composition of calcareous sandstones in these thin sections it seems likely that the Spilsby Sandstone is the source of this tempering material. Support is given to this suggestion by the presence of oolitic ironstone. These highly distinctive inclusions are characteristic of the Claxby Ironstone, which crops out along the Wolds edge and overlays the Spilsby Sandstone. Notably, just south of Elsham, the Claxby Ironstone weathers to form clayey, oolith-rich soils (Gaunt *et al.* 1992, 71-3). The mineralogy of these samples is, therefore, wholly consistent with the geology close to Elsham. Finally, the presence of igneous rock and the carboniferous sandstone in these samples suggest that the crushed Spilsby sandstone was added to boulder clay.

There is considerable similarity between this group and the Cleatham Calcareous Sandstone and the Calcareous Sandstone Groups. It is distinguishable from these groups on account of a lack of fossiliferous material (which characterises the former group) and the presence of very coarse grained quartz and chert, and the iron rich ooliths, which are absent from both of these other groups.

Related Sections

Fabric Group Name:	**Calcareous Sandstone Group**	
Samples:	ELAJ001, ELAJ002, ELAJ047, ELAJ076, ELAJ100, ELAJ129, ELAJ130, GP028, GP032, GP069, GP088.	
Cemetery-cemetery:	None.	
Cemetery-settlement:	ELAJ129, ELAJ130 = GP032. ELAJ100=GP069=GP032.	
Settlement-Settlement		

I Microstructure:

a) Voids	Consisting mainly of mega channels and vughs. Well aligned with margins, probably resulting from the shrinkage when drying. Secondary calcite deposition in ELAJ32. Carbonised organics in few voids, not added as temper but more likely to be naturally occurring in the clay.
b) C/f related distribution	Porphyritic. Single to open spaced.
c) Preferred orientation	No preferred orientation inclusions although voids are well aligned with margins.

II Groundmass:

a) Homogeneity Homogenous.

b) Micromass (material less than 0.01mm)

(i) Optical state	Optically active
(ii) birefringent fabric	Moderately optically active (ELAJ31 and ELAJ130) to highly optically active(ELAJ02, ELAJ05, ELAJ129, GP032)
(iii) colour	
x40 in ppl:	red-brown
x40 in xp:	brown-orange
c) Inclusions:	
i) c:f ratios	
c:f:v $_{0.01}$	c.80:15:5
Coarse Fraction:	Medium sand to very coarse sand (0.25mm to 2.00mm)
Fine Fraction:	Fine sand and below (0.025mm to 0.01mm)
ii) texture	Eq and el. a-r, <1.76 mm.
iii) composition	
Coarse Fraction	0.25mm to 2.00mm
Frequent:	**Quartz;** eq and el. sa-sr < 0.75 mm. mode 0.40mm. Undulose extinction, micro-fractures, vacuoles, ?iron staining in fractures.
Common:	**Calcareous sandstone;** eq. sa-sr. < 1.76mm. mode 0.80mm Fragments can be seen to contain medium to coarse the following inclusions, in calcite and micrite cement; quartz, polycrystalline quartz, orthoclase feldspars and iron opaques (chert in ELAJ100). The composition suggests that the sandstone should be classified as a coarse grained, poorly sorted quartzwacke **Calcite;** eq and el. sa-r < 0.50mm. mode 0.25mm. Includes well formed rhombic crystals.
Few:	**Polycrystalline Quartz;** eq and el. sa-sr < 1.00 mm. mode 0.40mm. Ranging from coarse grained (ELAJ130 – some with kalonite cement attached) to fine grained (ELAJ01). **Orthoclase and microcline fledspa:** eq and el. sa-sr < 0.75 mm. mode 0.40mm. Weathered, altering to clay and sericite. In ELAJ02 single grain of plagioclase

with a perthitic texture.

Very Few: **Iron-rich opaques;** el and eq. sr-wr. < 0.50. mode 0.30 mm. Single examples of iron rich ooliths in ELAJ05.

Rare: **Carbonised vegetal matter***;* probably blades of grass (ELAJ01, ELAJ130) and chaff (ELAJ02).

Coarse grained sandstone; quartz grains sa-sr. < 1.50 mm. Kalonite cement (ELAJ02 ELAJ130). Some grains have straight sides to what are otherwise s-r suggesting overgrowth. Based on mineralogy should probably be described as sub-arkose or quartz arentite.

Very Rare to Absent: **Dolerite;** eq. a. < 1.20 mm (ELAJ129).

Plutonic igneous: el, sa, ,<1.0mm, comprising quartz, plagioclase feldspars altering to fine grained white mica and biotite altering to chlorite (in ELAJ100) and in sample ELAJ047 there are fragments of perthite.

Chert. eq. and el. sr-sa. < 0.50. mode 0.40mm. In ELAJ02 one rounded grain, very coarse (1.36 mm) – red in ppl.

Fine Fraction Fine sand and below (0.025mm to 0.01mm)

Frequent **Quartz;** sa-sr. coarse silt

Clacite/micrite

Metamorphic fragments: el-eq. sr-sa. < 0.15mm. Pollycrystaline quartz with biotite laths, possibly schist.

Few-very few **Opaques**

Muscovite mica

III Textural concentration features:

a) Tcf%: None

b) Note:

Comments

This is an homogenous group, characterised by the addition of a medium to coarse grained calcareous sandstone added as temper to boulder clay. The sandstone comprises moderately to poorly sorted, sub-angular to rarely rounded loosely to closely compacted quartz grains in a calcareous matrix. The potters formed these vessels by coiling – that is by joining successive rings, or coils of clay, one on top of the other. This is demonstrated by samples ELAJ100 where shrinkage of the clay when drying has pulled the coil joins apart leaving a diagonal void running through the vessel wall, indicating the location of the coil-join. The optical activity of the groundmass in these samples demonstrates that the potters were not firing their vessels to very high temperatures, certainly no higher than c.850^{o}C, and the presence of carbonised organic material in voids demonstrates that the vessels were not fired for a sufficient time to allow the organic material to fully burn out Reedy 2008, 185-6; Tite 1995; Hodges 1963).

Fragments of kaolinite cemented sandstone and igneous rocks present in samples ELAJ002, ELAJ100, ELAJ130 and the dolerite in sample ELAJ129, suggest that the parent clay may have been a boulder clay. The perthites and altered biotite are characteristics of the Criffel-Dalbeattie and the Shap granite of the south-western Scotland and Cumbria, respectively (Ixer and Vince 2009, 16-7), and the kalonite cemented sandstone is characteristic of sandstone present in the Pennines and the Vale of York (Vince 2006).
The numerous glaciations that brought material from south western Scotland, the Lake District and Northumbria explain the presence of this lithology in these samples. Granites from south-west Scotland (the Criffel-Dalbeattie) and the Shap were carried southwards through the Vale of York by pre-Devensian ice flows. These materials were deposited by the glaciers, and their associated melt-waters, in the in the various tills and sand and gravel deposits in North Lincolnshire, particularly in the Ancholme and Trent Valleys. Indeed, Devensian deposits containing such materials are found along the Wold's western slope and the eastern edge of Jurassic limestone scarp in the Ancholme Valley (Wilson 1971, 72, 79-80; Gaunt *et al.* 1992, 109-123; Ixer and Vince 2009, 14).

The calcareous sandstone which characterises this group appears to have been added as temper, with the angularity and poor sorting of fragments demonstrating that the potters were crushing the sandstone in the preparation of the paste. The same range of inclusions were noted in a sample from Barnetby le Wold, analysed by Vince (2005b). Vince suggested that the Elsham Sandstone might provide the raw material for his section. In agreement, Gaunt *et al.* (1992, 66) have described the Elsham Sandstone as a medium to coarse grained, moderately to poorly sorted and comprises sub-angular to rarely rounded loosely to closely compacted in an argillaceous or calcareous matrix. The sandstone outcrops along the Wolds edge, around Elsham and it seems likely that this formation provides the raw materials for tempering this group. As noted above, the composition of the parent clay agrees with that those boulder clays found on the western scarp of the Lincolnshire Wolds; Barnetby le Wold and Elsham are both situated on the crest of this scarp. It is likely, then, these clays and the Elsham Sandstone provide the raw materials for potting.

There is considerable similarity between this group and the Cleatham Calcareous Sandstone and the Calcareous Sandstone and Coarse to very Coarse to Well Rounded Quartz and Chert Groups. It is distinguishable from these groups on account of a lack of fossiliferous material (which characterises the former group) and the absence of very coarse grained quartz and chert (which characterise the latter group).

Related Sections

Fabric Group Name:		**Calcite and Dolerite Group**
Samples:	ELAJ132	
Sub Groups: Cemetery-cemetery Cemetery-settlement		

I Microstructure:

a) Voids	Meso vughs and channels crudely aligned with the vessel walls. Probably resulting from the shrinkage of clay or over-tempering. Single void with carbonised deposit – probably resulting from naturally occurring organics in the clay.
b) C/f related distribution	Single to open spaced
c) Preferred orientation	Non apparent, other than voids crudely aligned with walls.

II Groundmass:

a) Homogeneity

b) Micromass (material less than 0.01mm)

(i) Optical state	Highly optically active
(ii) birefringent fabric	Bistrial b-fabric

(iii) colour

x40 in ppl:	Orange-brown
x40 in xp:	Orange-brown

c) Inclusions:

i) c:f ratios

$c{:}f{:}v_{0.01mm}$	85:10:5
Coarse Fraction	Medium sand to very coarse sand (0.25mm to 1.5mm)
Fine Fraction	Fine sand and below (0.25mm to 0.01mm)

ii) texture

iii) composition

Coarse Fraction

Predominant	**Spary Calcite:** sr-a, eq and el, <1.5mm, mode 0.6mm.
Few	**Opaques**: sr-sa, eq, <1.25mm, mode 0.25mm. Probably iron-pan deposits.
Rare	**Quartz**: monocrystalline, sr-sa, eq, <0.3mm, mode 0.25mm. Traversed by vesicles; showing strain shadows and undulose extinction.
Very Rare to Absent	**Feldspar:** Orthoclase, microcline, and plagioclase, eq, <0.3mm, mode 0.25, weathered – altering to clay.
	Quartz: Polycrystalline, eq, <0.3mm, mode 0.25. Sutured grain boundaries, coarse silt to fine sand sized grains.
	Fossiliferous limestone: sr, el, <0.8mm, brachiopod shell fragments with well developed radiaxial fibrous mosaic of calcite along shell edges.
	Dolerite: eq, 1.5mm, single fragment. Ophytic texture, composed of medium grains of plagioclase feldspars enclosed in pyroxene. Plagiocalse weathered.

Fine Fraction

Frequent	**Calcite:** Sparry calcite

	Quartz: medium silt
Common	**Opaques:** medium silt
Few-very few	**White Mica:** silt sized
	Orthoclase feldspar: fine sand sized

III Textural concentration features:

a) Tcf%: None

b) Note:

Comments

This loner sample is characterised by coarse, angular grains of sparry calcite. The calcite appears to have been crushed and added to the clay as temper, whilst the dolerite might be a constituent of the parent clay, a ferruginous boulder clay. The optical activity of groundmass demonstrates that this pot was not fired to very a high temperature – probably in the region of 550-750^{o}C and certainly no higher than c.850^{o}C. The presence of carbonised organic material in voids demonstrates that the vessel was not fired for a sufficient time to allow the organic material to fully burn out (see Hodges 1963; Reedy 2008, 185-6; Tite 1995).

The source of the sparry calcite in this sample is puzzling. Although calcite tempered pottery is occasionally found on sites on the Lincolnshire Wolds, it is rare (Young and Vince 2009, 349). Contrastingly, this type of pottery is a common find in Yorkshire, and as such it is generally perceived that Lincolnshire's sparry calcite-tempered pottery was 'imported' from there. Certainly, the small collection of this type of pottery recovered from the city of Lincoln is thought to have been produced in the Vale of Pickering (Young, et al. 2005, 32). The sparry calcite that is used to temper the Yorkshire pottery is believed to have been obtained from calcite veins present in the chalk of the Yorkshire Wolds (Young, et al. 2005, 32). Given that Lincolnshire's Wolds are a southerly continuation of those in Yorkshire it is possible that this sample was produced using calcite obtained from a vein in the chalk of the Lincolnshire Wolds, perhaps from a source close to Elsham. However, as there are no accessory minerals or lithological clasts in this sample which have a clear Lincolnshire Wolds origin, there is nothing that would support such a notion. For example, there are no coarse well-rounded quartz or chert grains, nor are there any fragments of calcareous cemented sandstone or oolitic ironstone, which, as we have seen, are often found as accessory minerals in Wolds produced pottery (see for example, Elsham Granitic Group). Perhaps the only clast which might hint at an origin on the Lincolnshire Wolds is the fragment of dolerite. Dolerite, deriving from Whin Sill, is known in the glacial clays and tills that flank the Wold's eastern edge (Gaunt *et al.* 1992). However, as we shall see, the presence of this dolerite might also be used to support the notion of a Yorkshire origin.

In Yorkshire, sparry calcite tempered pottery is relatively common. Indeed, it is known from the early Anglo-Saxon cemeteries of Sancton (East Yorkshire) (Vince 2004) and West Heslerton (West Yorkshire) (Haugton and Powlesand 1999, 124-7) an the Iron Age sites of Rudston, Burton Fleming (Freestone and Middelton 1991, 163) and Burton Agnes (Leslie *et.al* 2004, 7-11) and the Bronze Age site of Thwing (Wardle 1992, 115). Notably some of the sparry calcite-tempered pottery from Thwing contains dolerite – a comparison with this Thwing pottery is imperative, as this could confirm or refute an East Yorkshire provenance.

Related Sections

Fabric Group Name:	**Cleatham Calcareous Sandstone Group**
Samples:	MT002, MT004, MT023, MT062, MT066, MT082, MT088, MT090, MT091, MT094, MT132, MT152, GP021, WHA09, WHA08, WHA12.
Sub Groups:	Main Group: MT002, MT004, MT023, MT066, MT088, MT091, MT094, MT152, WHA09, WHA08, WHA12. Sub Group A: MT062, MT082 Sub group B: MT090, GP021 Sub Group C: MT132
Cemetery-cemetery	
Cemetery-settlement	GP021 = MT090
Settlement-settlement	
a) Voids	Consisting mainly of mega channels and vughs. Well aligned with margins, probably resulting from the shrinkage when drying. Carbonised vegetal matter also seen in voids suggesting. These appear to be naturally occurring inclusions in the clay rather than being added as temper.
b) C/f related distribution	Porphyritic. Single to open spaced.
c) Preferred orientation	Relatively developed preferred orientation of voids; voids are sub-parallel to the walls. Rarely do they follow the line of relic coils (WHA08)
II Groundmass:	
a) Homogeneity	Very homogeneous group, characterised by fine to medium grained calcareous sandsotne.
b) Micromass (material less than 0.01mm)	**60-80%**
(i) Optical state	Moderately optically active to highly optically active
(ii) birefringent fabric	Striated b-fabric
(iii) colour	
x40 in ppl:	red-brown
x40 in xp:	brown-orange
c) Inclusions:	
i) c:f ratios	
c:f:v $_{0.01mm}$	c. 85:5:10 to c.75:20: 5
Coarse Fraction	Medium sand to vary coarse sand (0.25mm to 2.25mm)
Fine Fraction	Fine sand or less (0.25mm to 0.01mm)
ii) texture	
iii) composition	
Coarse Fraction	**(>0.25mm)**
Dominant to Frequent:	**Quartz**; eq and el. sa-sr < 0.75 mm. mode 0.25mm. Undulose extinction, with few grains showing micro-fractures and vacuoles. **Calcite***;* eq and el. sa-r < 0.50mm. mode 0.25mm. Includes well formed rhombic crystals deriving from crushed calcareous sandstone fragments.
Common-Few:	**Calcareous sandstone***;* eq. sa-sr. < 2.25mm. mode 0.80mm Fragments contain fine to medium grained sa-sr quartz grains in a calcite cement. Bioclastic material is also present in the matrix of some of the fragments. For example, brachiopods, gastropods and chrinoids (WHA09, WHA08, WHA12, MT023, MT002). Ooliths are also present in the limestones see in MT023; these are formed around shell fragments.

Few:	**Polycrystalline Quartz;** eq and el. sr-r < 0.75 mm. mode 0.40mm. Coarse to fine grained with sutured grain boundaries.
Rare:	**Sandstone*:*** medium to coarse grained sandstone, sa-sr. < 1.60mm, mode 0.8mm. Some grains in the coarse sandstones have straight sides to what are otherwise s-r, suggesting overgrowth. These sandstone also contains quartz and rarely plagioclase and microcline feldspars. Poorly sorted to well sorted. Modal grain size 0.3mm. Based on mineralogy should probably be described as sub-arkose or quartz arenite. Rarely the sandstones are seen to contain kaolinite cement (MT091)
Very Rare to Absent:	**Chert**: eq. and el. sr-sa. < 0.75. mode 0.40mm.

Fine Fraction (<0.25mm)

Frequent	**Quartz**: sa-sr, eq and el. Predominantly mono-crystalline, rarely polycrystalline, poorly sorted fine sand to silt sized grains. **Plagioclase Feldspar:** eq and el. sa-sr < 0.125 mm. mode 0.10mm. Weathered, altering to clay and sericite. **Metamorphic fragments.** el-eq. sr-sa. < 0.15mm. Polly crystalline quartz with biotite laths, possibly schist.
Few-very few	**Opaques***:* sa-sr <0.125mm **Muscovite mica***:* silt sized laths

III Textural concentration features:

a) Tcf%:	<5%
b) Note:	MT091, sharp to merging boundaries, rounded, prolate and equant, neutral to slightly optically dense, contains open spaced sr-r quartz <0. 25mm, concordant. WHA08 and WHA09, sharp boundaries, sr, prolate to equant, optically dense, largely inclusionless matrix, but for rare to absent silt sized quartz grains. Brown black in PPL (x40), dark orange brown in XP (x40). This suggests that the entire sand sized fraction was added as temper. MT066, 5mm concordant tcf, neutral optical density, clear to merging boundaries, rounded. This tcf represents the un-tempered clay.

Comments

This is an homogenous group, characterised by fragments of calcareous sandstone which has been crushed and added to the clay as temper. The sandstone comprises fine to medium grained, rarely coarse, sub-angular to sub-rounded, quartz grains in calcite cement; characteristically, they also contain oolite and fragments of fossiliferous limestones, comprising brachiopod shells, gastropods and chrinoids. The potters formed these vessels by coiling – that is by joining successive rings, or coils of clay, one on top of the other. This is demonstrated by samples WHA09 in which the shrinkage of the clay when drying has pulled the coil join apart leaving diagonal void running through the vessel wall, indicating the location of the join. The optical activity of the groundmass in these samples demonstrates that the potters were not firing their vessels to very high temperatures, certainly no higher than c.850^{o}C, and the presence of carbonised organic material in voids demonstrates that the vessels were not fired for a sufficient time to allow the organic material to fully burn out (see Reedy 2008, 185-6; Tite 1995; Hodges 1963).

The fine sand fraction in the tcfs demonstrates that the fine fraction was present in the parent clay and that the calcareous sandstones have been added as temper. The kaolinite and haematite cemented sandstones, the weathered plagioclase, and the metamorphic rock fragments suggest that that the parent clay is a boulder clay

This calcareous sandstone group is separable from the Elsham Calcareous Sandstone Group and the

Coarse Grained Sandstone with Coarse to Very Coarse Well Rounded Quartz and Chert Group on account of the finer grain size of sandstone, the lack of the very coarse grained quartz and chert and the presence of characteristic fossiliferous and oolitic clasts. There are a number of geological formations in the locality of Cleatham which provide this suite of lithology. The Ravensthorpe Beds, for example contains the Elleker Limestone which is fine sub-angular grained quartz sandstone. Within this sandstone, shell fragments have acted as calcite cementations; poorly formed ooliths are also present. Comprising a fine to medium but locally coarse, moderately to poorly sorted, sub-angular to rounded grain calcareous cemented sandstone, the Kellaways Rock Member also provides the range of inclusions noted. This member also contains brachiopods and is known to be exposed south of Hibaldstow – just 3km north east of Cleatham (Gaunt *et al.* 1992, 62) – notably sample GP021 if from Hibaldstow. The upper member of the Cornbrash formation also draws parallels with the lithology in these sections. A commonly sandy conglomerate it also includes locally calcitic sandstones. The member forms a scarp near Hibaldstow and exposures of calcite cemented sandstone are known near Roxby [SE958 168] and Thornholme [SE9652 1253 and SE9654 1223] (Gaunt et al 1992, 56-7). Thornholme is but a few kilometres south of West Halton, from where WHA08, WHA09, and WHA12 derived. In the north of the county a fine-grained calcitic sandstone is provided by the Marlstone Rock Member. This sandstone also contains berthierine (chamosite), siderite and goethite mud and oothiths, brachiopods, bivalves, and crinoids (Gaunt *et al.* 1992, 40-1).

It is probable, then, given the number of exposures of these various geological formations that the potters producing this Calcareous Cemented Sandstone Group were obtaining raw materials from one of these formations. In agreement, all samples in this group derive from sites on the west of the River Ancholme, exactly where all these geological formations are located.

Related Sections

Sub groups	Sub Fabric A MT132: This sample contains the same suit of minerals as the main group. However, in this instance the matrix is void free and very little material has been added to the clay. The matrix is characterised by fine silt sized quartz and muscovite. The parent clay is perhaps the same as the silty clays used on the ironstone and organic tempered groups. Silty clays are area available in the locality of this cemetery. Indeed they are known from the Vale of York Glacial Lake Deposit in the Ancholme Valley and in the Marginal Sands and Gravels of the Trent Valley (ref). Sub Fabric B MT082 and MT062: Again these samples contain the same range of material as described in the main group. In this instance, however, 30-50% of the coarse fraction is composed of granitic rock fragments. These are <1.0mm, mode 0.75mm, sa-a and comprise very coarse gained plagioclase, orthoclase and microcline feldspars, quartz, perthite, spherulite, biotite and muscovite. Few plagioclase feldspars are altering to sericite and clay. Sub Fabric C: GP021 and MT090 These samples are separable from the main group on account of an

additional constituent in the fine fraction. Here the fine fraction is dominated by poorly sorted sa, eq opaques that is a constituent of the parent clay.

Fabric Group Name:		**Cleatham Dolerite Group**
Samples:	MT008, WHA02, GP003	
Sub Groups:		
Cemetery-cemetery		
Cemetery-settlement	MT008=GP003	

I Microstructure:

a) Voids	Meso and macro vughs. Rarely mega vughs (MT008). Voids appear to be due to shrinkage during drying.
b) C/f related distribution	Double to open spaced
c) Preferred orientation	Voids ranging from well developed, parallel to the vessel wall, to poorly developed.

II Groundmass:

a) Homogeneity — Relatively homogenous group characterised by the inclusion of dolerite fragments that were added as temper to relatively fine clay.

b) Micromass (material less than 0.01mm) **80%**

(i) Optical state	Slightly optically active
(ii) birefringent fabric	Striated b-fabric
(iii) colour	
x40 in ppl:	Red-brown
x40 in xp:	Dark red brown

c) Inclusions:

i) c:f ratios

$c{:}f{:}v_{0.01}$	c.90:5:5
Coarse Fraction	Medium to very coarse sand (0.25mm to 1.5mm)
Fine Fraction	Fine sand and below (0.25 mm and below)

ii) texture

iii) composition

Coarse Fraction

Dominant to Common:	**Quartz**: monocrystalline, sr-r, <0.5mm, mode 0.25mm.
Few :	**Doleirte**: sr-sa, eq and el, <1.5mm, mode 0.75mm. Ophitic texture, composed of medium grains of plagioclase feldspars enclosed in augite. Plagioclase weathered. **Plagioclase feldspars**: sr-sa, eq and el. <0.5mm, mode 0.25mm simply twinned and weathering to clay. These grains represent material disaggregated from the dolerite fragments. **Quartz**; poly-crystalline, sr-r, <0.5mm, mode 0.25mm. Sutured grain boundaries.
Very Few:	**Orthoclase feldspars**: sr-r, eq and el. <0.5mm, mode 0.4mm weathering to clay.
Very rare to absent:	**Sandstone**: poorly sorted quartz wacke composed of medium grained single spaced r-wr quartz monocrystaline grains with undulase extinction (Single fragment in MT008, 1.1mm along longest axis). **Sandstone**: medium grained quartz arenite, < 1.5mm, mode 0.8mm overgrown grain boundaries and kaolinite cement.

Fine Fraction

Predominant	**Quartz**
Common	**Plagiacose feldspars**

Rare **Pyroxen**

Muscovite mica

III Textural concentration features:

a) Tcf%: <3%

b) Note: Tcf in MT008 sharp to merging boundaries, concordant, neutral optical density, dark brown red in ppl, brown in xp (x40). The coarse fraction is single spaced, rather than the double to open seen in the rest of the sample. This suggests that a coarser clay might have been added to the clay parent clay.

Comments

This is a relatively homogenous group, characterised by the inclusion of dolerite, added to the clay as temper. The potters formed these vessels by coiling – that is by joining successive rings, or coils of clay, one on top of the other. This is demonstrated by sample GP003, in which the shrinkage of the clay when drying has pulled the coil join apart leaving a diagonal voids running through the vessel wall. The optical activity of the groundmass in these samples demonstrates that the potters were not firing their vessels to very high temperatures, probably in the region of 550-750^{o}C and certainly no higher than c.850^{0}C, and the presence of carbonised organic material in voids demonstrates that the vessels were not fired for a sufficient time to allow the organic material to fully burn out (Reedy 2008, 185-6; Tite 1995; Hodges 1963).

Dolerite has been noted in Anglo-Saxon pottery from the cemetery of Sancton (Yorkshire) and probably derives from the Whin Sill dolerites in the Cheviot Hills in the north of England (Ixer and Vince 2009, 14, 17). Whilst it is possible that these pots are derived from the same source as the Sancton material, it is more likely that they have a North Lincolnshire origin. Indeed, Chevoit Hills derived rocks are found in the Devinsian till and glacial sands and gravels in the north of the county. In the north-west of the county, a small deposit of boulder clay containing porphyrites (such as dolerite) is known close to West Halton, whilst larger deposits dolerite bearing of boulder clay flank the eastern edge of the Lincolnshire Wolds; in particular, a thick mass of clayey glacial sand and gravel is known around Melton and Barnetby le Wold (Wilson 1971, 72; Gaunt 1992 *et al.*, 118). Further glacial drift brought, that passed through the Vale of York, carried Carboniferous sandstones from the Vale southwards. These were deposited in the Trent and Ancholme Valleys (Gaunt 1992 et *al*. 122). The lithology present in these samples, then, is in accordance with the drift geology of the area.

It is notable that both of the non-funerary find-site samples in this group (WHA02 and GP003) derive from West Halton and Barnetby le Wold, the exact location where dolerite is known to be present in the glacial clays. It is likely then, that as the Cleatham sample is indistinguishable from the Barnetby le World sample, that the former was transported to Cleatham from a manufacturing site close to, if not from, Barnetby le Wold.

Related Sections

Fabric Group Name:	**Cleatham Granitic Group**
Samples:	MT025, MT030, MT046, MT049, MT052, MT053, MT055, MT057, MT058, MT063, MT183, MT184, GP008, GP010, GP012, GP017, GP029, GP030, GP057, GP058, GP074, GP077, GP081, GP098, GP099, GP100, GP106, GP107, GP109, GP110, WHA05, WHA10.
Sub Groups:	Main Group: MT025, MT030, MT049, MT052, MT053, MT055,MT057, MT183, GP010, GP012, GP017, GP030, GP057, GP074, GP081, GP100, GP106, WHA10 Sub Fabric A: MT046, MT184, GP058, GP077, GP098, GP107, GP109, GP110, WHA05. Sub Fabric B: MT058, GP008, GP029. Sub Fabric C: MT063. Sub Fabric D: GP099.
Settlement-settlement	GP077=GP109
Cemetery-cemetery	
Cemetery-settlement	

I Microstructure:

a) Voids — Meso to mega voids; predominantly channels and planar voids with rare vughs. Vughs predominantly contain carbonised vegetal matter – this may represent organic material present in the parent clay.

b) C/f related distribution — Double to open spaced.

c) Preferred orientation — Voids aligned with vessel walls; voids probably deriving from shrinkage of the clay.

II Groundmass:

a) Homogeneity

b) Micromass (material less than 0.01mm) **C.75-80%**

(i) Optical state — Highly optically active

(ii) birefringent fabric — B-fabric

(iii) colour

x40 in ppl: Orange brown

x40 in xp: Dark red brown

c) Inclusions:

i) c:f ratios

$c:f:v_{0.01}$ — c. 90:5:5 to c.85:10:5.

Coarse Fraction — Medium sand to granules (0.25mm to 3.0mm)

Fine Fraction — Fine sand and below (<0.25mm)

ii) texture

iii) composition

Coarse Fraction

Common: — **Quartz**: a-r, eq and el, <1.0mm, mode 0.8mm. Mono-crystalline, rarely commonly showing undulose extinction.

Few: — **Plutonic igneous rock**: eq and el, sr- a, <3.0mm, mode 1.2mm. Fragments composed of zoned plagioclase – commonly altering to

	sericite – quartz, orthoclase feldspars, biotite mica and biotite mica altering to chlorite. Including green amphibole in GP081 and MT183.
	Quartz: a-r, eq and el, <1.0mm, mode 0.8mm. Polly-crystalline, fine to coarse grains with sutured grain boundaries, commonly showing undulose extinction.
	Feldspars: Orthoclase and plagioclase, eq and el. a- sr, 1.2mm, mode 0.9mm, plagioclase altering to fine grained sericite and clay minerals.
Very Few:	**Biotite**: tabular laths, el, <1.0mm, mode 0.6mm. Commonly altering to chlorite.
	Chlorite: tabular laths, el, <1.0mm, mode 0.6mm (GP017).
Few to Rare:	**Perthite**: quartz feldspar intergrowths, eq and el. a-sr, 1.2mm, mode 0.9mm.
	Iron opaques: sa-r, eq and el. <0.75mm, mode 0.5mm. in sample GP074 (probably iron pan deriving from the Northampton Sand)
Very Rare to Absent:	**Amphibole**: green amphibole, single grain in GP012, 0.35mm, prismatic, simply twinned. 1.5mm prismatic crystall in MT183, enclosed in biotite laths. Also noted in GP081.
	Sandstone: medium grained, 0.5mm in GP074, ferruginous cement (probably the Northampton Sand – see Medium Sandstone Group)

Fine Fraction

Predominant	**Quartz**: sr-sa grains
Common	**Opaques**: iron rich grains, sr-sa
Rare to very rare	**Quartz**: silt sized grins
	Mica: fine to very fine silt sized grains

III Textural concentration features:

a) Tcf%: None

b) Note:

Comments

This is an homogenous group, characterised by plutonic igneous rock that has been added as temper to a boulder clay. The potters formed these vessels by coiling – that is by joining successive rings, or coils of clay, one on top of the other. This is demonstrated by samples GP055 in which the shrinkage of the clay when drying has pulled the coil joins apart leaving diagonal voids running through the vessel wall, indicating the location of the coil-joins. The optical activity of the groundmass in these samples demonstrates that the potters were not firing their vessels to very high temperatures, certainly no higher than c.850^{o}C, and the presence of carbonised organic material in voids demonstrates that the vessels were not fired for a sufficient time to allow the organic material to fully burn out (see Reedy 2008, 185-6; Tite 1995; Hodges 1963).

The coarse fraction is characterised by plutonic igneous rocks, the rounding and weathering of which demonstrates that they do not derive from freshly crushed rock (although see Sub-Fabric D, below). Although few grains are seen to be angular, which might suggest crushing of larger fragments, this can be explained by the mode of transport - glacial action (see below) usually gives rise to angular fragments (Wardle 1992, 58) and it is these inclusions derive from glacial deposits.

By examining the mineralogy in these samples it is possible to suggest the origin of the igneous rocks. The suite of minerals indicates that the most likely sources are the Criffel-Dalbeattie granodiorite of south-western Scotland and the Shap adamellite granite of Cumbria. The Shap granite is characterised by rod and bead perthites, altered zoned plagioclase feldspars and biotite altering to chlorite, whilst the Criffel-Dalbeattie is characterised by green amphibole, altered and zoned plagioclase feldspars, perthite and altered biotite (Ixer and Vince 2009, 16-7). Most samples in this group contain zoned plagioclase feldspars and biotite which is altering to chlorite, suggesting a Shap or Criffel-Dalbeattie origin, whilst green amphibole, characteristic of the Criffel-Dalbeattie granite is present in samples GP012 and MT183.

The numerous glaciations that brought material from south western Scotland and the Lake District explain the presence of this lithology in these samples. Granites from south-west Scotland (the Criffel-Dalbeattie) and the Shap (Lake District) were carried southwards through the Vale of York by ice flows. On passing through the Vale they collected other material, such as Carboniferous Sandstones, which are characterised by the inclusion of kaolinite cement. These glacial erratics were carried south, through the Vale, in to the Trent Valley and were deposited by the glacier and its associated glaciolacustrine and fluvial waters – particularly Lake Humber which extended into the Trent and Ancholme Valleys. A second ice flow carried the same Scottish material (the Criffel-Dalbeattie) through into Northumbria and then southwards along the east coast. In passing though Northumbria this latter flow picked up material from the Cheviot Hills, including a pyroxene bearing granite (as this deposit did not pass through the Vale of York it did not pick up the Shap granite or the Carboniferous Sandstones). These materials were deposited by both glaciers, and their associated melt-waters, in the in the various tills and gaciolacustrine sand and gravel deposits in North Lincolnshire. They were therefore freely available as a source of raw material to the early Anglo-Saxon potters. The Devensian till, which contains the Cheviot Hills material, flanks the eastern edge of the Wolds and it is also known in the north of Ancholme Valley, close to West Halton. Pre-Devensian and Devensian deposits, which contain material from the glaciers that passed through the Vale of York are situated along the Wold's western slope, the eastern edge of Jurassic limestone scarp in the Ancholme Valley, and the Trent Valley (Wilson 1948, 72, 75-80; Gaunt *et al.* 1992, 109-123; Ixer and Vince 2009, 12-14).

The suit of minerals identified in these samples indicate that the source of the igneous material is likely to be the Criffel-Dalbeattie granodiorite of south-western Scotland, the Shap adamellite granite of Cumbria. Notably, the pyroxenes, indicative of Cheviot Hill granites, identified in the granitic group from Elsham, are absent in these samples. The presence of the kaolinite cemented sandstone (in Sub-Fabric A) samples and the general lack of pyroxene bearing granite suggests that the raw materials used to make this pottery ultimately derive from the ice forms that passed through the Vale of York. It is suggested, then, that these raw materials were obtained from glacial deposits west of the Lincolnshire Wolds. This supported by the presence and absence of a range of accessory minerals and lithologies in the samples. For instance, these samples are lacking the Wolds based oolitic Claxby Ironstone (this was present in the Wolds derived samples in the Elsham Granitic Group). Although calcareous sandstones, also noted in the Elsham Granitic Group, are present in Sub-Fabric B, these are accompanied by fossiliferous inclusions that are more in keeping with the Jurassic limestones located to the west of the Wolds (for example, the Snitterby Limsetone or the Cleatham Limestone; see Cleatham Limestone Group for a full discussion of the geology of the various limestones and the Cleatham Calcareous Sandstone Group). In summary, although these samples contain the same range of Shap and Criffel-Dalbeattie igneous rocks as the Elsham Granitic Group, they are separable from the Elsham group on account of the absence of the characteristic Wolds inclusions, and the pyroxene bearing granite, but the presence of Carboniferous Sandstones and Jurassic limestones. Cumulatively, this suggests that the raw materials used in the production this group of pottery were derived from deposits west of the Lincolnshire Wolds.

Related Sections
Sub Fabric A:

Samples MT046, MT184, GP058, GP098, GP077, GP107, GP109, GP110, WHA05.
These samples contain the same range of characteristic plutonic igneous material as noted in the main fabric group. In these samples, however, the fine fraction accounts for a much greater proportion of the non-plastic clasts in the clay paste. The clay is characterised by fine sand and silt which are characteristics typical of boulder clays (Vince 2004, 6-9). In agreement, a single tcf present in MT046 contains the entire silt and fine sand fraction noted in the rest of the clay matrix, demonstrating that the fine fraction was a constituent of the parent clay (diffuse to merging boundaries, concordant, neutral optical density, distorted pellet shape orange brown to straw grey in PPL x40 and red brown to yellow brow in XP). This fine fraction comprises predominantly fine sand sized mono-crystalline quartz, commonly fine sand sized polycrystalline quartz – composed of very fine grains with sutured boundaries, – commonly silt sized quartz grains, rare fine sand sized plagioclase and orthoclase feldspars, rare fine sand sized opaque grains and very rare to absent biotite, (possible) volcanic glass, and chert. The coarse fraction also contains carboniferous sandstone (WHA05) fragments, <1.25mm, mode 0.9mm with overgrown grains set in a kaolinite cement.

Sub Fabric B:
Samples MT058, GP008, GP029.
These samples contain the same suit of igneous material as described in the main group, but in this instance the micro-mass contains silt sized quartz grains, and the coarse fraction also includes calcareous material, including crenulated impunctate brachiopods, calcareous sandstone and calcite crystals. Again this probably the result of a boulder clay being used. All samples contain carboniferous sandstone comprising coarse grained quartz, with overgrown boundaries set within a kaolinite cement.

Sub Fabric C:
Sample MT063
This sample is characterised by the inclusion of plutonic igneous material as described in the main group. In addition, however, it also contains Common iron opaques and extremely ferruginous calcareous material. Opaqes are sa-sr, <0.6mm, mode 0.25mm. Calcareous material is restricted to the fine fraction and appears to be part of the parent clay, although the clay itself is not calcareous. The clay is probably derived from the Jurassic rocks on the west of the River Ancholme.

Sub Fabric D:
Sample GP099
This sample is characterised by coarse to very coarse <2.3mm, mode 1.5 sa-s, fresh crushed plutonic igneous rock set in a silty clay. The composition of the igneous materials the same as the main group with hornblend, biotite altering to chlorite and zoned plagioclase feldspars. The clay in this sample is so similar to silty clays used in the Organic Tempered Group and the Cleatham Ironstone Group that it probable that they derive from the same source.

Fabric Group Name:	**Cleatham Ironstone Group**
Samples:	MT076, MT097, MT098, MT099, MT100, MT101, MT104, MT105, MT106, MT107, MT108, MT109, MT110, MT112, MT113, MT114, MT115, MT116, MT118, MT120, MT149, ELAJ86, GP022, GP084, GP085, GP094.
Sub Groups:	Main Group: MT099, MT106, MT107, MT108, MT110, MT112, MT114, MT120, GP084, GP022, GP085, GP91, GP094, GP097. Sub Group A: MT076, MT098, MT104, MT105, MT109, MT115, MT118, MT149. Sub Group B: MT097, MT101, MT100. Sub Group C: MT116, ELAJ086. Sub Group D: ELAJ087, ELAJ091, ELAJ093.
Cemetery-cemetery	MT116=ELAJ086
Cemetery-settlement	GP022 = MT106, MT108, MT112; GP084, GP085 and GP094= MT106, MT108, MT110, MT112

I Microstructure:

a) Voids — Predominantly macro- and mega-planar voids and mega vughs.
b) C/f related distribution — Closed to open spaced
c) Preferred orientation — Aligned parallel to vessel walls

II Groundmass:

a) Homogeneity — Homogenous.

b) Micromass — **c.75-80%**

(i) Optical state — Highly optically active (MT116) to slightly optically active (MT105, MT106).
(ii) birefringent fabric — Randomly striated to parallel and grano-striated b-fabric

(iii) colour
x40 in ppl: Deep orange-brown to orange-brown
x40 in xp: Brown-orange to orange-brown

c) Inclusions:
i) c:f ratios
$c:f:v_{0.01}$ — c.65:30:5
Coarse fraction — Fine to very coarse sand (0.125mm to 2.0mm)
Fine Fraction — Fine sand and below (0.125mm)
ii) texture
iii) composition

Coarse Fraction (>0.125mm)

Frequent to Common: — **Opaques**; el. and eq, sr-a, poorly sorted ranging from fine sand to 2.0mm, mode 1.0mm. Fragments are predominantly opaque, few contain single silt to medium sand sized sr eq quartz and polycrystalline quartz and plagioclase feldspar grains (MT114) or numerous closed to open spaced well sorted medium to fine sand grains (MT114, GP022, GP85). Opaques are commonly sub-round to sub-angular and rarely angular; notably the angular material always occurs alongside more rounded grains.

Common to Few: — **Quartz**; el and eq sa-sr < 0.6mm, mode 0.4mm without undulose extinction.

Very Few:	**Polycrystaline quartz**: *el and eq* sa-sr < 1.6mm, mode 0.4mm. Fine to coarse grains with sutured boundaries. **Quartz**; el and eq sa-sr < 0.6mm, mode 0.4mm with undulose extinction. **Orthoclase feldspars**: el and eq sa-sr < 0.6mm, mode 0.4mm.
Rare to Absent	**Fossiliferous limestone***:* eq and el sa-r. <0.65mm. (MT107 and MT109).
Very Rare to Absent:	**Siltstone/Clay Pellets:** sa-sr medium to fine silt sized quartz grains and mica, probably muscovite, and biotite (GP094 and MT109, MT107, MT120) **Amphibole***:* eq, r, 0.4mm, (MT106) **Basalt**: eq. 0.45mm very weathered fine grained plagioclase feldspars altering to clay minerals. Iron stained (MT106) **Plutonic igneous rock:** el and eq sr <0.3mm weathered orthoclase feldspar and biotite (MT107). **Sandstone:** el and eq sa fragments of fine grained quartz arenite with ferruginous cement <0.6mm. **Perthite**: eq, sr, <1.1mm (MT107) **Chert**: eq, sr <0.4mm.

Fine Fraction (0.125 to 0.01mm)

Frequent	*Quartz; eq and el sa silt sized*
Common	*Muscovite and biotite;* Silt sized laths.
Rare to absent	Clinopyroxene silt sized grain (MT107)

III Textural concentration features:

a) Tcf%:	<1% void free
b) Note:	Red-brown, sharp to merging boundaries, rounded, equant, high optical density, concordant.

Comments

This group is characterised by the inclusion of medium to very coarse sand sized grains of opaque iron-rich material. These opaques are commonly sub-round to sub-angular and rarely angular; notably the angular material always occurs alongside more rounded grains, suggesting that they were not crushed before being added to the clay. The optical activity of the groundmass in these samples demonstrates that the potters were not firing their vessels to very high temperatures, certainly no higher than c.850^{o}C, and the presence of carbonised organic material in voids demonstrates that the vessels were not fired for a sufficient time to allow the organic material to fully burn out (see Reedy 2008, 185-6; Tite 1995; Hodges 1963).

Iron-pellets are a relatively common mode of tempering in early Anglo-Saxon pottery and have been noted in pottery from settlements and cemeteries alike (Young and Vince 2009, 347). Vince (2004, 6-9, 15; 2003a, 9) describes the pellets in detail in his petrographic analysis of pottery from the cemetery of Sancton (Yorkshire) and the settlement at Brough (Nottinghamshire). He concluded that the pellets are likely to derive from an iron-pan or an iron ore deposit, such as the Northampton Sands. Although he did not undertake any thin section analysis, Leahy thought that the iron-pellets in the Cleatham urns were likely to be metal-working slag that had been crushed and added to the clay as temper (Leahy 2007a, 7, 227). Whilst slag tempering is certainly known in the Anglo-Saxon period, at West Heslerton and Sancton, for example (Vince 2004; Vince n.d.), this practice is rare. Slag tempering is identified in thin section by the presence of fayalite (a by-product of iron-working), and angular opaque fragments that develop from the act of crushing. None of these characteristics were, however, present in any of the thin sections sampled for this thesis, and so Leahy's suggestion about the possible use of metal-working slag can be discarded. It is likely, then, that the ferruginous inclusions in these samples, like those from Brough (Vince 2003a, 9), derive from an iron-pan deposit. It is encouraging to find that the ferruginous iron-pan forming Northampton Sand and the Pecten Ironstone crop out within 4km of Cleatham, and although not known in exposure close to the site, the Frodingham Ironstone and iron-pan forming Thorncroft Sands constitute the underlying bedrock (Gaunt *et al.* 1992, 34-6, 53-4, 40-5).

Related Sections:

Sub Fabric A:

MT076, MT098, MT099, MT104, MT105, MT109, MT113, MT115, MT118, MT149

Whilst the coarse fraction of these samples is the same as that of the main group, this sub group is separable on account of the clay body used to prepare the paste. The silt sized fraction present in the main group is absent from the samples in this sub-group. MT104 and MT109 also contain coarse grained sandstone fragments; kaolinite cement is clearly present in the sandstone sample MT104. A single fragment of a ferruginous limestone is present in MT109 it is eq, sr and 1.55mm along the longest axis whilst an el 1.5mm amphibole crystal is present in MT105.

Sub Fabric B:

MT097, MT101, MT100

But for the opaque iron, the micromass in these samples are almost completely devoid of inclusions; indeed the c:f:v ratio is c.90:3:7, with the micromass accounting for c.80% of the paste. Sample MT097 also contains rare sr eq fine to medium grains of calcite.

Sub Fabric C:

MT116 and ELAJ86

These samples are separable from the main group on account of the quantity of limestone and the lack of a fine fraction; indeed, inclusions below 0.25mm are very rare to absent (those noted are of fine quartz silt and fine muscovite silt) (c:f:v = c90:5:5). The limestone fragments are common and of a bio-sparite comprising echinoid spines, chrinoids and brachiopod shells. These probably derive from the Lincolnshire limestone (see limestone group).

Sub Fabric D:

ELAJ87, ELAJ91, ELAJ93

These samples are very similar to Sub-Group A, however they are separable on account of the composition of the coarse fraction. Again the coarse fraction is dominated by the iron rich opaques, and once more mono- and polycrystalline quartz are aggregated in these samples. In addition there are rare examples of medium to coarse grained wr quartz and chert, similar to those noted in the Coarse Well Rounded Quartz and Chert Group. There also very rare to absent fine to coarse fragment of micrite, or perhaps chalk. This lithology is therefore in keeping with an origin on the Lincolnshire Wolds, precisely is precisely where these samples were obtained from (see for example the Very Coarse Well Rounded Quartz and Chert Group). The clays in these samples are almost devoid of a fine fraction c:f:v = c.90:5:5, with iron opaques predominant in the coarse fraction.

Fabric Group Name:	**Cleatham Limestone Group**	
Samples:	MT017, MT019, MT026, MT028, MT033, ELAJ037, ELAJ103, WHA03, WHA06, WHA07, WHA11, WHA16.	
Sub Groups:	Main Group: MT017, MT019, MT026, MT028, MT033, ELAJ037, ELAJ103, WHA03, WHA06, WHA07, WHA11, WHA16. Sub Fabric A: WHA17, WHA18, WHA19 Sub Fabric B: ELAJ104, GP047, GP048	Sub Fabric C: MT015, MT059, MT191 Sub Fabric D: MT016, MT018 Sub Fabric E: MT001, MT003 Sub Fabric G: MT027, MT032 Sub Fabric H: MT029
Cemetery-cemetery		
Cemetery-settlement	GP047 = ELAJ104	
Settlement-settlement		

I Microstructure:

a) Voids	Predominantly meso to macro vughs and channels; rarely mega vughs and channels. Voids aligned with vessel walls. Rarely the voids can be seen to contain the remains of carbonised material (not added as temper but present in the parent clay) and in agreement the rims of these voids are reduced (MT028, MT029). Vessicular voids in MT031 up to 2.5mm in diameter and filled with secondary calcite.
b) C/f related distribution	Closed to open spaced
c) Preferred orientation	Weekly to strongly developed. Larger fragments of shell are seen to be aligned with the vessel walls where coils have been squashes and joined. In other instances they are orientated in slight arcs, revealing relic coils (MT109).

II Groundmass: **70-90%**

a) Homogeneity	Very heterogeneous group on account of difference in composition of the parent boulder clays and the variability in the range of fauna present in the different limestones.
b) Micromass (material less than 0.01mm)	
(i) Optical state	Slightly optically active to (MT028) to highly optically active (MT027)
(ii) birefringent fabric	Mosaic speckled b-fabric and medium mono-to granostriated b-fabric
(iii) colour	
x40 in ppl:	Straw grey to black
x40 in xp:	Dark brown-black to golden yellow brown
c) Inclusions:	
i) c:f ratios	
$c{:}f{:}v_{0.01}$	c.80:5:15 to c.50:47:3
Coarse Fraction	Medium sand to granules 0.20mm 2.5mm
Fine Fraction	Fine sand or less <0.20mm
ii) texture	
iii) composition	
Coarse Fraction	
Predominant to Common:	**Fossiliferous limestone**: eq and el. sr-a, <2.4mm along longest axis,

mode 1.2mm. Composed of micritic peloids, brachiopod shell fragments, gastropods, valves of pseudo punctuate brachiopods (MT017), ribbed impunctate brachiopods (WHA16), impuncate brachiopods, mollusc fragments, chrinoids, and echinoids spines (MT019). The limestone is extremely ferruginous with iron oxide staining between the cementing calcite crystals and opaque iron infilling the pores of chrinoids. In samples MT017 and WHA16 the calcite crystals form a radiaxial fibrous mosaic along the boundary of briachiopods shell fragments. Ooids are rare but are seen in samples GP009, MT028 and ELAJ36. The limestone should be classified as a biosparite.

Common to Few: **Quartz**: sa-sr, eq and el. <0.5mm, mode 0.2mm.

Very Few to Absent: **Sandstone fragments**: sa-sr, <0.75mm , fine grained, ferruginous cement, slightly metamorphosed, with undulose extinction. The dominance of quartz in this sandstone suggests that it should be classified as a quartz arenite. (MT029, ELAJ103, WHA16, MT003, MT001). In samples WHA03 and WH06 the sandstones are seen to be cemented with kaolinite and the quartz grains are overgrown.

Calcareous sandstone fragments: eq and el, sr-sa, <1.70mm, mode, poorly sorted quartz coarse to fine grained sa-r quartz grains in a spary calcite matrix.

Quartz*:* sr-wr, <0.8mm, mode 0.3mm, polycrystalline, sutured grain boundaries, with grains exhibiting undulose extinction.

Plutonic igneous rock fragments: sa-r, <2.5mm, mode 0.8mm, composed of coarse grained microcline frequently weathering to clay minerals, feldspar and quartz intergrowths with granopyhric texture, fine grained muscovite mica (WHA03, WHA11, WHA016).

Very Rare to Absent: **Hornblend**: a, 1.2mm. Yellow to brown in XP.

Dolerite: sa, 1.2mm, single fragment in WHA06, weathered.

Fine Fraction

Dominant — ***Quartz:*** sa-sr very fine sand sized

Common to rare — **Opaques***:* sr-sa, fine sand sized

Rare to absent — ***Mica:*** muscovite and chlorite silt sized grains

Feldspars: eq, sa-sr, <0.25mm, mode 0.125mm. Plagioclase and orthoclase feldspars.

III Textural concentration features:

a) Tcf%: None

b) Note:

Comments

This is a largely homogenous group, characterised by highly fossiliferous limestones that have been added as temper to boulder clay (see Sub Groups, below, for the rare instances of where Limestones are set within Jurassic and silty clays). That the parent clay is boulder clay is demonstrated by the inclusion of micas, feldspars, hornblend, dolerite, and plutonic igneous fragments (see Cleatham Granitic Group, Elsham Granitic Group, Cleatham Two-Mica Granite Group and Dolerite Group for discussions on the provenance of these inclusions. The potters formed these vessels by coiling – that is by joining successive rings, or coils of clay, one on top of the other. This is demonstrated by samples MT028, MT031, MT103 in which the shrinkage of the clay when drying has pulled the coil joins apart leaving diagonal voids running through the vessel wall, indicating the location of the coil-joins. That coiling was the method of manufacture supported by the orientation of fossil shell inclusion in sample MT018 – here shell fragments show preferential orientation along the join of two coils. The optical activity of the groundmass in these samples demonstrates that the potters were not firing their vessels to very high temperatures, certainly no higher than c.850^{o}C, and the presence of carbonised organic material in voids demonstrates that the vessels were not fired for a sufficient time to allow the organic material to fully burn out (see Reedy 2008, 185-6; Tite 1995; Hodges 1963).

There is considerable variation in the rage of fossilised species contained in the limestones in these samples. Some, such as MT015, MT191 and MT016, are dominated by brachiopod shells, in others brachiopods are only a minor constituent and are accompanied by crinoids, echinoids and gastropods. All these fossils are present in the various beds that make up the Lincolnshire Limestone and therefore there is little point in attempting to distinguish between the various deposits represented in the samples. For example, the Snitterby Limestone contains abundant bivalves and crinoids. Crinoids and bivalves are also present in the Cleatham Limestone, but here they are accompanied by ostracods, echinoids, gastropods and foraminifera; the same range of fauna are represented in the Scawby Limestone and Kirton Cementstones. Ooliths are present in the Marlstone Rock Member and these are accompanied by brachiopods, bivalves and crinoids, whilst the Hibaldstow Limestone contains laminated calcite ooliths, echinoderms and bivalves. All these formations outcrop at various points along the Limestone scarp, from Winterton in the north, to just Kirton in Lindsey in the south (Gaunt *et al*. 1992, 46-55).

This group is separable from the Elsham Limestone Group, on account of the limestone temper. Whereas the limestones in this group are dominated by well preserved fossils, those in the Elsham group are micritised and are accompanied by micritic peloids and frequent bioturbation burrows – these are characteristics of the Tealby Limestone, located on the Lincolnshire Wolds (Gaunt *et al.* 1992, 74).

Related Sections

Sub groups

Sub Fabric A
WHA19, WH17, WH18
These samples are characterised by the inclusion of a very fine grained sparry calcite limestone, with very few bioclasts. This limestone appears to have been added to a very fine Jurassic clay with almost no quartz silt in the groundmass. The fragments of calcareous material show considerable rounding, this might be a consequence of the crushing and grinding of a very friable limestone rather than limestone derived sand being added.

Sub Fabric B
ELAJ104, GP048, GP047
Samples in this sub-group are characterised their clay bodies. The limestone in these samples has added to a very silty clay – probably alluvium (the same as that seen in the Organic Tempered Group and the Ironstone Group). Limestone includes chrinoid plates, brachiopods and is extremely ferruginous. Sample ELAJ104 has additional dung tempering.

Sub Fabric C:
MT015, MT059, MT191
These samples are characterised by the shell fragments that make up the limestone. The limestone is almost exclusively composed of brachiopod fragments which are up to 5mm in length. The limestone

has been added to a fine clay, with very little quartz silt; it is characterised by the inclusion of silt sized opaques and is probably Jurassic.

Sub Fabric D:
MT018, MT016
These samples are also characterised by the dominance of brachiopod shell fragments in the limestone. The potters have utilised a boulder clay, characterised by the inclusion of poorly sorted sand, comprising sa-sr granitic fragments (including hornblende, orthoclase and zoned plagioclase feldspar and quartz – these are characteristic of the Shap granite – see Cleatham Granite Group), sr-r medium grained mono and polycrystalline quartz and possibly schist.

Sub Group E:
Again this group is characterised by the inclusion of brachiopod shells, but in this instance the limestone is accompanied by a fine grained sandstone with ferruginous cement which has been crushed and added as temper. It is possible that the limestone fragments were in the clay before tempering – although the clay is not calcareous. The micromass has no muscovite mica and almost no quartz silt, it is probably Jurassic.

Sub Group G:
MT027 and MT032
Samples in this sub group are characterised by the inclusion of fine to medium sr-r and, composed of mono and polycrystalline quartz. A single tcf demonstrates (in MT032) that they were present in the parent clay and were not added as temper. Micritic limestone has been added to the clay as temper. Fragments range from silt to small pebbles (5.2mm). Pisolites are also present in MT032 and opaque iron <1.5mm, mode 0.8mm.

Sub Group H:
MT029
Fine Jurassic clay, fine grained sparry calcite limestone crushed and added to the clay. The sample also includes few fragments of fine to medium grained iron cemented sandstone, and disaggregated grains, suggesting that the sandstone has been added to the clay as temper.

Fabric Group Name: **Cleatham Oolitic Limestone Group**

Samples: ELAJ027, ELAJ028, ELAJ029, ELAJ033, ELAJ035, ELAJ128, MT034, MT035, MT038, MT039, MT040, MT042, MT043, MT044, MT045, MT054, GP013, GP036, GP041, GP104, WHA13, WHA14, WHA15.

Sub Groups: Main Group: ELAJ027, ELAJ028, ELAJ029, ELAJ035, MT035, MT038, MT039, MT042, MT043, MT044, MT045, MT054, GP013, WHA13, WHA14, WHA15
Sub Fabric A: GP036, GP104
Sub Fabric B: ELAJ033, ELAJ128
Sub Fabric C: MT040
Sub Fabric D: MT034
Sub Fabric E; GP041

Cemetery-cemetery:

Cemetery-settlement: GP104=GP036
WHA15=ELAJ27

I Microstructure:

a) Voids: Ranging from meso- to mega-voids and channels. Voids aligned to the vessel walls. Commonly voids contain organic material – grasses – which probably derive from the addition of dung (MT039). Edges of voids are reduced indicating the burning of organic material. Circular macro voids are also present from leached ooids as are mega vesicles, probably deriving from leached fragment of limestone.

b) C/f related distribution: Closed to open spaced

c) Preferred orientation: No-preferred orientation

II Groundmass:

a) Homogeneity: Relatively homogenous, any differences in these samples are largely the result of natural variability in the composition of the

b) Micromass (material less than 0.01mm) **65-90%**

(i) Optical state: Slightly to highly optically active

(ii) birefringent fabric: Thick random striated b-fabric

(iii) colour

x40 in ppl: Pale to dark orange-brown

x40 in xp: Golden brown to dark brown

c) Inclusions:

i) c:f ratios

$c{:}f{:}v_{0.01}$: c.80:10:10 to c.92:5:3

Coarse Fraction: Fine sand (0.125mm) to very coarse sand (0.125 to <2.0mm)

Fine Fraction: Very fine sand (0.125mm) or less

ii) texture

iii) composition

Coarse Fraction

Dominant to few: **Oolitic Limestone:** Eq and el, sr and a, ranging from 0.1mm to <1.6, mode 0.4mm. Moderately well sorted oosparite comprising ooids of less than 1.0mm in diameter, micro oncoids, micritic peloids <0.75mm. Predominantly the ooids are formed around calcite and micrite nuclei and rarely around sand sized quartz grains and shell fragments - foraminifera at the centre of an oolith in MT044. Calcite crystals forming the cement range in size from 0.1mm to 0.5mm. Rarely are bioclasts present in the fragments although gastropods (MT039) and bivalve shells are noted. The ooliths are commonly seen to have weathered iron stained rims (MT039) and iron stained concentric bands. Sa-sr fine grains of opaque material, probably pyrite, are also present in the cement (GP013, WHA13). Compacted ooliths in ELAJ29. Outer layers of shell fragments are seen to be micritised with the centres being in-filled with calcite crystals.

Few **Quartz***:* eq and el. sa quartz grains <0.75mm, mode 0.4mm. Grains show undulose extinction. Rarely calcite crystals are seen to adhere to the surface of the grains suggesting that they derive from the calcareous sandstone discussed below.

Very Few: **Calcareous Sandstone:** Eq and el. <0.75mm. Comprising sa eq medium sand sized quartz grains. Grains are seen to contain vacuoles and undergo undulose extinction (MT039).

Quartz*:* sa-sr aq and el, <1.0mm, mode 0.6mm. Polycrystalline, showing undulose extinction and sutured grain boundaries. Chlorite laths are also present both within individual grains and on the boundaries of grains.

Few to absent **Sandstone:** sa- sr eq and el <0.8mm (MT044, MT042, MT054, WHA13, GP013). Fine to medium grained well sorted, slightly metamorphosed, overgrown grain boundaries - some sutured grain boundaries. (probably deriving from a glacial sand or clay). Coarse gained in MT035 with muscovite laths growing in the cement.

Plutonic Igneous: sa-sr eq and el. < 0.8mm, mode 0.5mm (MT044, MT042, MT054, WHA13, GP013). Comprising feldspars, both orthoclase and microcline, heavily weathered altering to clay minerals. Rarely are the feldspars see to have a perthitic texture (probably deriving from a glacial sand or clay)

Feldspars*:* eq and el. sa-sr <0.5mm, mode 0.3mm. Both orthoclase and microcline feldspars present. Frequently weathered. Few have perthitic textures.

Very rare to absent: **Calcareous siltstone/fine sandstone:** <1.5mm, sa-sr coarse silt to fine sand sized grains in an FE cement (ELAJ33, GP013).

Dolerite: 0.5mm single grain in MT035

Fossiliferous Limestone: sr, 4mm. In WHA14, biosparite. Bedding planes seen in the structure. Composed of bivalve shell fragments, bryozoa, ribbed impuncate brachiopods, foraminifera. Iron staining around the shell fragments and between the calcite crystals. Fine grained calcite matrix.

Fine Fraction

Predominant **Quartz***:* sa coarse silt

Common **Opaques***: silt sized, probably pyrite opaques – pisolites*

Few-very few **Mica***;* silt sized laths of muscovite, biotite and chlorite (MT042)

III Textural concentration features:

a) Tcf%: 5%-10% (MT039, MT043, MT038, MT040)

b) Note: El and eq, sr-r, <2,0mm, mode 0.5mm. Sharp to merging boundaries, sub rounded to rounded, moderately high optical density to neutral, concordant, comprising silt to fine sand sized grains open spaced. Voids seen in these Tcfs range from mega to meso vughs and channels. Brown to pale brown in PPL and golden brown to dark brown in XP. Optically active to slightly optically active.

Comments:

This is a relatively homogenous group, characterised by the presence of oolitic limestone fragments which have been added as temper to boulder clay. The potters formed these vessels by coiling –

that is by joining successive rings, or coils of clay, one on top of the other. This is demonstrated by samples MT040 and WHA14 in which the shrinkage of the clay, when drying, has pulled the coil joins apart leaving diagonal voids running through the vessel wall, indicating the location of the coil-joins. The optical activity of the groundmass in these samples demonstrates that the potters were not firing their vessels to very high temperatures, probably in the region of 550-750^{o}C and certainly no higher than c.850^{o}C, and the presence of carbonised organic material in voids demonstrates that the vessels were not fired for a sufficient time to allow the organic material to fully burn out (Reedy 2008, 185-6; Tite 1995; Hodges 1963).

It is unlikely that a uniform mode of production in the preparation of the oolitic limestone before it was added to the clay as some of these samples suggest that the limestone was crushed prior to being added (WHA13, WHA14, MT042, GP036, GP104), whilst others might derive from detrital sands of weathered oolitic limestone (MT043, MT039, MT040).
The oolitic limestones represented in these samples are likely to derive from oolitic limestones within the broader Lincolnshire Limestone. For example, the Santon Oolite, Elleker Limestone, Scawby Limestone, and the Hibaldstow Limestone are all, to varying degrees oolitic (Gaunt *et al*. 1992). Of note, are samples WHA13 and GP013, which have sub angular to sub rounded opaque grains aggregated in a micritic matrix. Such aggregate grains are characteristic of the Scawby Limestone. A characteristic of the Hibalstow Limestone is that, whilst being a friable oolitic limestone, it also contains spar filled shells (Gaunt *et al*. 51-3). Such fossiliferous material is a constituent part of the oolitic limestones seen in samples (ELAJ027, ELAJ028, MT038, MT035, MT042, WHA14, WHA12, GP013). The Santon Oolite is characterised by coarse grained ooliths, gastropods, bivalves, some crinoids and rare echinoids (Gaunt et al. 1992, 48-9). Such a suit of material would agree with the composition of the oolitic limestone seen in MT039. These limestones crop out at various points along the limestone scarp of Lincoln Edge: the Scawby Limestone is known to crop out at Broughton and West Halton (Gaunt *et al* .1992, 49-51); the Santon Oolite forms a scarp south of Winterton (Gaunt *et al.* 1992, 48-9) and the Hibaldstow limestone is exposed around Hibaldstow (Gaunt *et al.* 1992, 52-4)

Clay sources for these samples are likely to derive from glacial deposits on the western bank of the River Ancholme. Indeed, Gaunt et al. (1992, 118) note porphyrites in the till around Winterton and this agrees with the dolerite seen in Sample MT035. Glacially derived clays would also account for the plutonic igneous and medium grained sandstones with kaolinite cement noted in samples MT044, MT042, MT054, WHA13 and GP013 (see Cleatham and Elsham Granitic Groups and Glacially Derived Sandstone Group for discussion on the origins of these clasts).

Related Sections
Sub Fabric A
GP104, GP036
These samples are characterised by the inclusion of oolitic limestone. In this instance, however, the limestone appears to have been crushed and then added to the clay. None of the other accessory minerals and rocks, such as the sandstone, diorite and the plutonic igneous fragments, are present. Again the clays used are very fine and lacking in quartz silt; there are however common silt sized grains of calcite deriving from the crushed oolitic limestone.

Sub Fabric B:
ELAJ033, ELAJ128

The range of mineralogical inclusions in these samples are the same as in the main group, but in this instance the addition of organic material, probably dung, separate them from the main group. Carbonised organics fill voids and the voids have very reduced rims.

Sub Fabric C:
Sample MT040
This sample is characterised by the inclusion of crushed oolitic limestone in Jurassic clay. The Oolitic limestone fragments dominate the coarse fraction, with fine sand sized sr quartz grains accounting for <3% of the coarse fraction. A coil join in also evident.

Sub Fabric D:
MT034
This sample is characterised by the inclusion of oolitic limestone and iron rich opaques. Ooliths derive from the same oolitic limestones as noted in the main group and are seen to have silt sized quartz grains in their nuclei. The opaques are a-r and range in size from fine sand to 1.5mm, mode 0.4mm and are the same as those noted in the opaque iron group. The fine fraction is characterised by dominant fine silt sized quartz and mica.

Sub Fabric E:
GP041
In this sample the oolitic limestone has been added to a very sandy clay. The fine fraction is dominated by fine sand sized quartz and the coarse fraction is charaterised by predominant fragments of oolitc limestone and common coarse wr quartz grains.

Fabric Group Name:	**Cleatham Organics**
Samples:	MT111, MT122,MT123, MT124, MT125, MT126, MT127,MT128, MT129, MT130, MT131, MT192, MT193, MT194,MT195, MT196, MT197, GP015, GP018, GP034, GP043, GP044, GP051, GP075, GP079, GP089, GP095, GP103, ELAJ068, ELAJ069, ELAJ088, ELAJ106,
Sub Groups:	Main Group: GP075, MT126, MT129, MT130, MT192, MT194, ELAJ069, GP051, GP075, GP079. Sub Fabric A: MT123, MT128, MT193, MT195, MT196, GP015, GP034, GP043, GP089. Sub Fabric B: GP079, GP095, MT125, MT111, MT131, ELAJ106. Sub Fabric C:MT122, GP044, GP103 Sub Fabric D:ELAJ68 and ELAJ88 Sub Fabric E:MT197 Sub Fabric F:MT124

Cemetery-cemetery	ELAJ069 = MT126
Cemetery-settlement	GP015 = MT123 GP095 = MT125, MT131, MT111 GP075 = MT126, ELAJ069 GP079 = MT130 GP043 = MT193, MT195, MT196 GP103 = MT122

I Microstructure:

a) Voids — Predominantly mega channels and mega vughs (up to 3mm) resulting from burnt out organic material. In most cases carbonised blades of grass can still be seen within the voids.

b) C/f related distribution — Closed spaced to open spaced

c) Preferred orientation — Well developed with voids aligned parallel to the walls to very poor (GP075) although the poor orientation is probably due to the direction in which the thin section was cut. Indeed the voids are probably transverse sections through channels.

II Groundmass: **c.70%**

a) Homogeneity — Homogeneous group.

b) Micromass (material less than 0.01mm)

(i) Optical state — Slightly optically active to highly optically active

(ii) birefringent fabric — Randomly striated to bistrial b-fabric

(iii) colour

x40 in ppl: Orange brown to brown and orange-grey

x40 in xp: Light orange brown to deep orange-brown

c) Inclusions:

i) c:f ratio

c:f:v c. 0:15:85 to 0:5:95.

Coarse Fraction: Nil

Fine Fraction: Medium sand and below (0.5mm to 0.01mm)

ii) texture

iii) composition

Fine Fraction

Predominant:

Common: **Quartz**; eq sr-r <0.4 mm, mode 0.3mm monocrystalline with undulose

	extinction.
	Quartz: eq sr-r <0.4 mm polycrystalline, sutured grain boundaeries , equigranular with undulose extinction.
	Quartz: sa fine to coarse silt sized grains
	Feldspars: silt sized grains
	Muscovite mica: silt sized grains
Rare to Absent:	***Quartz***: eq, sa to sr <0.8mm (MT0126), containing vacuoles, with undulose extinction.
	Orthoclase feldspars; eq sr-r <0.4 mm, mode 0.3mm weathered.

III Textural concentration features:

a) Tcf%: None present

Comments

Given that the voids still retain carbonised material and these voids are rarely in excess of 2mm, it is suggested that the material was added to the clay in the form of dung - the short length of the grass being the result of chewing by the animals. The optical activity of the groundmass in these samples demonstrates that the potters were not firing their vessels to very high temperatures, certainly no higher than c.850^{o}C, and the presence of carbonised organic material in voids demonstrates that the vessels were not fired for a sufficient time to allow the organic material to fully burn out (see Reedy 2008, 185-6; Tite 1995; Hodges 1963). The clays used in the preparation of the clay paste were generally fine, generally lacking in lithic clasts and those that are present are of fine to medium sand size grains.

Related Sections:

Sub Fabric A:

MT123, MT128, MT193, MT195, MT196, GP015, GP043, GP034, GP089

Like the main group samples in this sub-group are characterised by the inclusion of organic material. They are separable, however, on account of the dung being added to extremely silty clay; indeed, the fine fraction results in a c:f:v ratio of c.0:50:50, with silt sized grains dominating. The silt fraction is dominated by quartz, with rare muscovite and feldspars. Tcfs account for c.10% of the micromass in GP034, they are discordant, prolate, sub-angular sub-rounded, to optically neutral to slightly dense, with sharp boundaries. They contain the same range of inclusions that characterise the fine fractions; they are probably clay pellets that were dry at the time of paste preparation. GP015 and MT123 are notable in that they also contain fine to coarse grained sandstone fragments - sa < 1.5mm quartzwacke, composed of quartz, microcrystalline quartz and feldspar (MT123, GP015, GP034). Kaolinite cement can be seen between grains and attached to disaggregated material. Laths of muscovite mica are also present. Quartz grains very rarely contain zircon, frequently they are overgrown with straight margins, and feldspars are weathered. Such sandstones are characteristics of the the Vale of York Carboniferous Millstone Grit often noted in glacial deposits from North Lincolnshire (see Glacially Derive Sandstone Group). They appear to have been crushed and added to the clay along with the dung. Angular coarse sand sized igenous rock fragments are also present in MT196 and comprise microcline feldspar, quartz, biotite, muscovite, granophyric quartz-feldspar intergrowths and feldspars altering to sericite (see Two Mica Granite Group for the origins of these clast).

Sub Fabric B:

GP079, GP095, MT125, MT111, MT131, ELAJ106.

Again this group is characterised by the inclusion of dung and like the main group it utilises a very fine near inclusionless clay. What separates from the main group is dominant to common el and eq. sr-a, opaques ranging from 0.16mm to 2.4mm, mode 0.9mm. Commonly they contain silt to very fine sand quartz grains. They are the same as the opaques noted in the *Cleatham Ironstone Group* and are thus likely to derive from an iron-pan deposit. It would appear that the potters were mixing tempers when producing the paste.

Sub Fabric C:
MT122, GP044, GP103
Like the main group, samples belonging to this sub-group are characterised by the inclusion of organic material, set in fine clay. They are separable on account of the additional crushed sandstone temper. The sandstone is composed of eq. sa fine to coarse grained quartz, grains frequently contain random and linear arrangements of vacuoles and they are set in a kaolinite cement; the sandstone should be classified as quartzwacke. Muscovite mica is also present in the kaolinite matrix in a fragment in sample GP103. Sandstone fragment <3.2mm, mode 1.0mm. Disaggregated grains are also present. As a result of these sandstone fragments the matrix in these samples account of c60% of the field of view, with the c:f:v ratio being c.70:10:20. Rare sa, <0.5mm, mode 0.4mm, opaque grains are also noted in sample MT122.

Sub Fabric D:
ELAJ68 and ELAJ88
Again these samples are characterised by the inclusion organic material as temper. In this instance the temper appears to have been added to boulder clay. Indeed, these samples contain a considerable array of lithologies and minerals, including common eq and el sr-r quartz <1.0mm, mode 0.3mm, rare fragments of calcareous sandstone containing medium to fine grained quartz and chalcedonic chert, sa-sr igneous rock fragments comprising muscovite, biotite, orthoclase feldspar, quartz and weathered plagioclase, medium to coarse grained sr-r opaque grains <3.6mm, mode 1.2mm. The matrix in these samples account of c75% of the field of view (x40), with the c:f:v ratio being c.75:5:20

Sub Fabric E:
MT197
This sample is separable on account of additional fine to coarse grained fragments of plutonic igneous rock. The micromass accounts for c.80% of the field of view. The c:f:v ratio in this instance is c.45:10:45. The igneous fragments are common within the coarse faction and comprise sa-sr <1.0mm weathered zoned plagioclase feldspar, probably deriving from the Shap granite (see igneous group), biotite mica, amphibole and un-zoned weathered plagioclase. The coarse faction is dominated by the sr-r fine sand sized quart. This may represent the use of a boulder clay as the parent clay.

Sub Fabric F:
MT124
This sample is to all intents and purposed the same as the main group. It does, however, include very rare limestone fragments sr el and eq <2.3mm. These may have simply been present the clay as dug.

Fabric Group Name:	**Cleatham Sands**	
Samples:	MT036, MT041, MT073, MT074, MT095, MT133, MT138, MT142, MT159, MT171, MT178, MT179, MT181, MT185, MT186, MT187, MT188, GP002, GP045, GP052, GP053, GP054, GP055,GP059, GP063, GP064,GP066, GP068, GP070, GP076, GP080, GP082, GP090, WHA04,	
Sub Groups:	Main Group: MT159, MT187, GP052, GP054, GP063, GP066, GP080 Sub Group A: MT074, MT133, MT159, MT181, MT187, GP002, GP064, GP090 Sub Group B: GP045, GP055, GP070, MT179 Sub Group C: MT036, MT095, MT142, MT171, MT188, WHA04, GP035 Sub Group D: MT073, MT138, MT185, MT186 Sub Fabric E: GP053, MT041 Sub Fabric F: GP059 Sub Fabric G: GP019	
Cemetery-cemetery		
Settlement-Settlement	GP054=GP080 GP055=GP045	
Cemetery-settlement		

I Microstructure:

a) Voids	Messo to mega voids and channels. Channels due to shrinkage of clay and aligned with margins. Vughs retain carbonised organic material. The wide range of shapes and sizes in the carbonised materials suggests that the organic materials was present in the parent clay.
b) C/f related distribution	Closed to open spaced
c) Preferred orientation	Shrinkage voids aligned with margins. Sample GP054, grains show lines of relic coils

II Groundmass:

a) Homogeneity

b) Micromass (material less than 0.01mm) **60-70%**

(i) Optical state	Slightly to weakly optically active, but the mature of the groundmass makes it difficult to see.
(ii) birefringent fabric	b-fabric
(iii) colour	
x40 in ppl:	Red-brown to opaque
x40 in xp:	Orange brown opaque
c) Inclusions:	
i) c:f ratios	
$c:f:v_{0.01mm}$	c.30:60:10 to c.10:85:5
Coarse Fraction	Medium sand to very coarse sand (0.25-1.25mm)
Fine Fraction	Fine sand and below (0.25 to 0.01mm)
ii) texture	
iii) composition	
Coarse Fraction	
Predominant:	**Quartz**: monocrystalline, sr-r eq and el, <1.25, mode 0.35mm undulose extinction, rarely due grains contain randomly aligned vacuoles.

Few:	**Plagioclase and orthoclase feldspars**: sr-r, eq and el, <0.5mm, mode 0.35mm. Weathering to clay minerals
Very Few:	**Quartz**: polycrystalline, sr-r, eq and el, <0.6mm, mode 0.35, medium sand to silt sized grains with sutured boundaries.
Very Rare to Absent:	**Chert**: <1.2mm, sr-r, eq, mode 0.35mm
	Plutonic Igneous fragments: <1.5mm, mode 1.0mm, composed of quartz and orthoclase feldspar
	Schist?: sr-r, eq and el, <0.5mm, mode 0.5mm, composed of quartz and mica, rarely showing schistosity.
	Opaques: sa-r, eq an el, < 4.4mm, mode 3.2mm probably deriving from an iron-pan deposit (GP080).
	Sandstone: <1.5mm, composed of medium to coarse grained quartz in a kaolinite cement.

Fine Fraction

Dominant	**Quartz**: Fine sand to fine silt sized, sr-sa grains
Common	**Opaques**: silt sized, r
Very Few-absent	**Mica**; white mica, silt sized laths
	Amphibole: fine sand sized
	Chert: fine sand size, red-brown in PPL
	Siltstone: sr-r, composed of coarse to fine silt in ferruginous matrix

III Textural concentration features:

a) Tcf%: <3%

b) Note: Sharp to merging boundaries. Rounded pellets, equant, neutral optical density, concordant. The fine fraction preset in the rest of the clay is present in the tcfs (GP054 and GP080).

Comments

This is a relatively homogenous group, characterised by medium to rarely coarse, modal grain c.0.35mm size, sub-rounded grains of well sorted sand which were probably present in the parent clay, a sandy boulder clay. The potters formed these vessels by coiling – that is by joining successive rings, or coils of clay, one on top of the other. This is demonstrated by sample GP068, in which the shrinkage of the clay when drying has pulled the coil joins apart leaving a diagonal void running through the vessel wall – this indicates the location of the coil-join. The optical activity of the groundmass in these samples demonstrates that the potters were not firing their vessels to very high temperatures, probably in the region of 550-750°C and certainly no higher than c.850°C, and the presence of carbonised organic material in voids demonstrates that the vessels were not fired for a sufficient time to allow the organic material to fully burn out (Reedy 2008, 185-6; Tite 1995; Hodges 1963).

The mineralogy of the Cleatham Sand Group is almost identical to that of the Cleatham Glacially Derived Sandstone Group. It comprises medium grained sand, composed of quartz, plagioclase and orthoclase feldspars, fine grained metamorphic rock – probably schist, and fragments of plutonic igneous rock and kaolinite cemented sandstone. However, the grains are smaller, better sorted, and considerably more rounded than those of the Cleatham Glacially Derived Sandstone Group. It is likely, then, that the potters responsible for producing this group of fabrics were sourcing their temper from a similar location to those of the Cleatham Glacially Derived Sandstone Group, but that the sand-temper in the latter group has been subject to further transport, such as in streams – resulting in the smaller grain size and rounding of the grains. This group is further distinguished form the Glacially Derived Sandstone Group on account of the iron opaques being more common in the former group.

Related Sections

Sub Group A:

MT074, MT133, MT159, MT187, GP002, GP064, GP090
This group is separable from the main group on account of the coarse fraction. In these samples the coarse fraction constitutes a larger proportion of the inclusions. The groundmass is also lighter in XP, rather than being almost opaque it is a deep red-brown.

Sub Group B:
GP045, GP055, GP070, MT179
This group is separable from the main group on account of a coarse fraction. Although the same suite of minerals and lithologies are present in these samples as in the main group, these are considerably lacking. The clay matrix in these samples is extremely silty and contains a significant amount of musciovite silt. Samples GP045 and GP055 are identical. Voids in samples GP045 indicate relic coils. The voids are present as a consequence of organic material also being added to the clay as temper.

Sub Group C:
MT188, WHA04, GP035
The fine fraction is largely missing from these samples. The matrix also of a paler colour in PPL and XP, these are possibly Jurassic clays

Sub Group D:
MT138, MT185
The fine fraction in these samples is absent. The same range of coarse inclusions as are represented in the main group is present in these samples. The iron opaques noted in the main group are also significantly more common in this group.

Sub Fabric E:
GP053, MT041
These samples are separable from the main group on account of the absence of a fine fraction.

Sub Fabric F:
GP059
The samples in this group contain the same suite of minerals in the coarse fraction. What separates them from the main group, however, is the fact that a silty clays has been used in the preparation of the clay body.

Sub Fabric G:
GP019
Samples in this group are to all intents and purposes the same as those in the main group. They are separable, however, on account of the temper being slightly coarser and more rounded, being r as opposed to sr-r.

Fabric Group Name: **Cleatham Well Rounded Quartz and Chert Group**

Samples: MT014, MT022, MT024, MT067, MT068, MT084, MT182, GP011, GP016, GP023, GP105

Sub Groups: Main Group: MT014, MT024, MT068, MT084, MT182, GP023, GP105
Sub A: MT022, GP011, GP016
Sub B: MT067

Cemetery-cemetery
Cemetery-settlement

I Microstructure:

a) Voids: Macro to predominantly mega vughs; meso voids predominate in GP023. Mega vugh in MT024 with reduced halo – resulting from burnt out organic matter; this does not have the appearance of dung tempering, rather it is likely that it is the remains of organic matter in the parent clay.

b) C/f related distribution: Closed to open spaced

c) Preferred orientation: Poorly developed, although voids are aligned with vessel wall this is likely to be a result of shrinkage.

II Groundmass:

a) Homogeneity

b) Micromass (material less than 0.01mm) **60-70%**

(i) Optical state Highly to slightly optically active

(ii) birefringent fabric b-fabric

(iii) colour

x40 in ppl: Golden brown to orange brown and black

x40 in xp: Dark brown-black to red orange

c) Inclusions:

i) c:f ratios

$c{:}f{:}v_{0.01mm}$ c.10:60:30 to c.25:70:5

Coarse Fraction: Medium sand to very coarse sand sized grains 1.2mm (0.2 to 1.5mm)

Fine Fraction: Fine sand and below (<0.2mm)

ii) texture

iii) composition

Coarse Fraction

Dominant to Common: **Quartz**: sr-sa, eq and el, <0.4mm, mode 0.3mm, monocrystalline showing undulose extinction, grains traversed by random arrangements of vacuoles.

Common: **Quartz**: sr -wr, eq and el, <1.2mm, mode 0.8mm, monocrystalline showing undulose extinction, grains traversed by random arrangements of vacuoles.

Rare to Absent: **Quartz**: sr-sa, eq and el, <0.4mm, mode 0.3mm, polycrystalline showing undulose extinction, fine to medium grains with sutured grain boundaries.

Chert: sr -wr, eq and el, <1.5mm, mode 0.5.

Orthoclase feldspars: sr, eq and el, <0.4mm, mode 0.3mm, heavily weathered.

Opaques: eq and el, sr-sa, <2.0mm, mode 0.7mm. Predominantly inclusionless; rarely do they contain silt sized quartz and feldspars.

Biotite: tabular lath 0.55mm

Plutonic igneous fragments: sr-sa, eq, 2.0mm, mode 1.25mm. Composed of coarse grained altered zoned plagioclase, biotite, perthite and quartz (MT014).

Fine Fraction

Predominant	**Quartz**: sa-sr eq and el fine sand sized grains
Common to absent	**Quartz**: sa-sr eq and el fine to coarse silt sized grains
Rare to absent	**Muscovite mica**: silt sized laths
	Opaques: r eq, silt sized

III Textural concentration features:

a) Tcf%: <2%

b) Note: Iron rich conceretions, optically dense, merging boundaries, <1.0mm, red-black in ppl and xp (x40), discordant.

Comments

This is a very homogenous group, characterised by coarse rounded grains of quartz and chert that have been added to the as temper to boulder clay. The potters formed these vessels by coiling – that is by joining successive rings, or coils of clay, one on top of the other. This is demonstrated by sample GP105, in which a void marks the location of a coil join that was pulled apart due to the shrinkage of the clay. The optical activity of the groundmass in these samples demonstrates that the potters were not firing their vessels to very high temperatures, probably in the region of 550-750^{o}C and certainly no higher than c.850^{o}C, and the presence of carbonised organic material in voids demonstrates that the vessels were not fired for a sufficient time to allow the organic material to fully burn out (Reedy 2008, 185-6; Tite 1995; Hodges 1963).

Given that the quartz and chert are well rounded and that the igneous fragments and sandstone are sub-angular, it is likely that the two originate from different sources. The igneous inclusions are likely to have been in the parent clay, a medium to coarse grained boulder clay, and the sand has been added as temper. As the sand grains are well sorted, and the rounding of quartz and chert suggest that they were water transported, it is likely that the sand was obtained from the locality of a water source.

Related Sections

Sub Fabric A:

MT022, GP011, GP016

These samples are separable from the main group on account of micromass. In these samples the micromass accounts for c.80% and the relative lack of a fine fraction. In sample GP011 the iron opaques are common.

Sub Fabric B:

MT067

These samples are separable on account of the parent clay; it is extremely ferruginous and indeed the iron rich tcfs noted in the main group account for c.15% of the field of view.

Fabric Group Name:	**Elsham Glacial Sands (sandstone) Group**
Samples:	ELAJ022, ELAJ045, ELAJ048, ELAJ055, ELAJ056, ELAJ058, ELAJ071, ELAJ072, ELAJ073, ELAJ074, ELAJ075, ELAJ078, ELAJ079, ELAJ081, ELAJ082, ELAJ094, ELAJ109, ELAJ110, ELAJ112, ELAJ126, ELAJ131.
Sub Groups:	Main Group: ELAJ022, ELAJ048, ELAJ058, ELAJ073, ELAJ074, ELAJ075, ELAJ079, ELAJ082, ELAJ109, ELAJ110, ELAJ112, ELAJ045, ELAJ131, Sub Group A: ELAJ055, ELAJ056, ELAJ071, ELAJ072, ELAJ078, ELAJ081, ELAJ094, ELAJ126
Cemetery-cemetery	None
Cemetery-settlement	None

I Microstructure:

a) Voids — Predominantly meso and mega channels due to shrinkage of clay. Rarely are samples seen to contain mega vughs. These vughs contain carbonised material, the shape and size of which suggests that they represent carbonised vegetal matter that was in the parent clay, rather than being added as temper.

b) C/f related distribution — Closed to open spaced

c) Preferred orientation — Only seen in the alignment of the channels- parallel to margins

II Groundmass:

a) Homogeneity — Relatively homogenous group. There are differences within the range of clasts seen in section these groups, but this is dies to the variability in the sand that was used to temper this pottery.

b) Micromass (material less than 0.01mm) **60-80%**

(i) Optical state — Slightly to highly optically active

(ii) birefringent fabric — b-fabric

(iii) colour

x40 in ppl: Brown to grey brown

x40 in xp: Brown to brown red-black

c) Inclusions:

i) c:f ratios

$c:f:v_{0.01mm}$ — c. 87:10:3 to c. 75:20:5

Coarse Fraction — Medium sand to coarse sand (0.125 to 2.0mm)

Fine Fraction — Fine sand and below (0.125mm and below)

ii) texture

iii) composition

Coarse Fraction

Predominant: — **Quartz:** sa-sr, eq and el, <1.15mm, mode 0.5mm, monocrystalline, traversed by micro-fractures.

Very Few: — **Sandstone**: eq and el, sa-sr, <1.5m, mode 0.75mm, composed of coarse to medium grained monocrystalline quartz with undulose extinction set in a haematite cement. Grains are slightly metamorphose with grain boundaries showing signs of suture.

Sandstone: eq and el, sa-sr, <1.5m, mode 0.75mm, composed of coarse to medium grained monocrystalline quartz, often with overgrown boundaries, set within a kaolinite cement.

Plutonic igneous fragments: eq and el, sa-sr, <1.5m, mode 0.6mm composed of quartz, orthoclase and perthite, biotite and plagioclase

	altering to white mica.
Very rare to Absent:	**Pyroxene**: 0.5mm (ELAJ079)
	Microcline feldspar: sr-sa, eq and el, <1.0mm, mode 0.5mm, weathered.
	Plagioclase feldspar: sr-sa, eq, <0.5mm, mode 0.3mm, altering to white mica.
	Calcareous sandstone: sr - sa, eq and el, <0.8mm, mode 0.6mm, composed of sr-r medium to fine sand in calcite cement. Disaggregated grains of calcite also present in the coarse and fine fraction.
	Sandstone: <0.6mm, eq and el, mode 0.5mm composed of sub angular medium grained quarts in a siliceous cement of coarse silt sized quartz.
	Chert: sr-r, eq and el, <0.75mm, mode 0.6mm also chalcedonic.

Fine Fraction

Predominant	**Quartz**: sa-sr fine sand sized to medium silt monocrystalline
Rare	**Siltstone**: sr-sa, composed of medium to coarse silt sized grains of quartz.
	Muscovite: fine sand sized laths to silt sized laths
	Quartz: sa-sr fine sand sized polycrystalline
	Opaques: r, fine sand sized
Rare to absent	**Hornblende:** sr-r, fine sand sized grains

III Textural concentration features:

a) Tcf%: None

b) Note:

Comments

This is a very homogenous group, characterised by a glacially derived sand that has been added as temper to a boulder clay. The sand comprises a range of sedimentary and igneous lithologies, some of which clearly derive from geological formations on the Lincolnshire Wolds, and other which have their origins in northern England and possibly Scandinavia. The potters formed these vessels by coiling – that is by joining successive rings, or coils of clay, one on top of the other. This is demonstrated by sample ELAJ073, in which the shrinkage of the clay when drying has pulled the coil join apart leaving a diagonal void running through the vessel wall. The optical activity of the groundmass in these samples demonstrates that the potters were not firing their vessels to very high temperatures, probably in the region of 550-750^{o}C and certainly no higher than c.850^{o}C, and the presence of carbonised organic material in voids demonstrates that the vessels were not fired for a sufficient time to allow the organic material to fully burn out (Reedy 2008, 185-6; Tite 1995; Hodges 1963).

The sand used as temper is characterised by the inclusion of four different types of sandstone. Three are medium to coarse grained, one of which is slightly metamorphosed, demonstrated by the interlocking, compacted and slightly sutured grain boundaries – the remnants of a haematite cement are also present; the second is characterised by the overgrown grains set in a kaolinite cement, whilst the third is characterised by sub-angular medium grained quartz with a cement of sub-angular to angular coarse silt sized quartz grains and haematite. The fourth is a fine to medium grained calcareous cemented sandstone, probably the Elsham Sandstone, but too few fragments are present to fully characterise it. Notably, all of the sandstone clasts show evidence of rounding and therefore they have not been crushed prior to their inclusion in the clay paste. That this material is added as temper is demonstrated by the bi-modal distribution of grains size.

Igneous rock fragments are also present in these samples, composed primarily of quartz and orthoclase feldspars, altered plagioclase feldspars and perthites, and very rarely biotite (possibly representing the Criffel-Dalbeattie granodiorite – see Elsham Granitic Group). There is, however, a notable lack of coarse laths of biotite altering to chlorite which are characteristic of this granodiorite. Thus, although glacial sands appear to have been used in the preparation of paste of samples in both this group and the Elsham Granitic Group, the source sands of each group are clearly not the same.

Despite the broad range of material noted in these samples, there are characteristics lithologies in this group which suggest an origin east of the River Ancholme. Firstly there are the fragments of the Wolds based Elsham Sandstone; secondly, although rare, there are fragments of pyroxene present in the coarse fraction of this group. Pyroxene bearing igneous rocks are characteristic of the Cheviot Hills - notably Cheviot Hills rocks are a constituent of the Devensian tills that flank the Wolds eastern edge (the melt-waters of this glacier also drained in to the Ancholme Valley through the Barnetby Gap – see Elsham Granitic Group). Finally, coarse grained chalcedonic cherts suggest a Wolds based source (see Very Coarse Well Rounded Quartz and chert Group). In contrast, the coarse grained kaolinite cemented sandstones suggest a source to the west of the Wolds. Indeed, the sandstones with kaolinite cement and overgrown quartz grains are characteristic of sandstones found in the Pennines and the Vale of York (see for example Vince 2006). As discussed in the petrographic description of the Elsham and Cleatham Granite Groups, pre-Devensian and Devensian glaciers from the south-west of Scotland travelled south, through the Pennines, into the Vale of York, picking up this material, and they and their associated melt-waters deposited this material in the Trent and Ancholme Valleys (Wilson 1971, 72, 79-80; Gaunt *et al.* 1992, 109-123; Ixer and Vince 2009, 14). Thus, in this petrographic group we have suit of minerals that are Wolds based, and a suit of minerals that are present in glacial deposits in the Ancholme Valley. As the Devensian glacier on the east of the Wolds did not cross them, but its melt waters flowed west, into the valley, perhaps we can suggest that the source of these raw materials lie somewhere between the River Ancholme and the foot of the Wolds. Certainly there are numerous glacial deposits at the foot of the Wolds that might provide this material.

Related Sections

Sub Group A:

ELAJ055, ELAJ056, ELAJ071, ELAJ072, ELAJ078, ELAJ081, ELAJ094, ELAJ126

This group contains the same coarse fraction as the main group. In this case the sand has been added to a very fine clay with no fine sand sized component; the clay is, however, extremely micaceous. The clay is highly birefringent and straw coloured in PPL. Sample ELAJ55 also contains a fragment of grog. The grog contains the same range of inclusions as the main clay body, but it is reduced.

Fabric Group Name:	**Elsham Granitic Group**	
Samples:	ELAJ006, ELAJ054, ELAJ057, ELAJ059, ELAJ060, ELAJ061, ELAJ062. ELAJ063, ELAJ064, ELAJ065, ELAJ080, ELAJ095, ELAJ097, ELAJ098, ELAJ099, ELAJ101, ELAJ124	
Sub Groups:	Main Group: ELAJ006, ELAJ054, ELAJ059, ELAJ060, ELAJ061, ELAJ063, ELAJ064, ELAJ065, ELAJ080, ELAJ095, ELAJ098, ELAJ101	Sub Fabric A: ELAJ099 Sub Fabric B: ELAJ062 Sub Fabric C: ELAJ097 Sub Fabric D: ELAJ057, ELAJ124
Cemetery-cemetery		
Cemetery-settlement		

I Microstructure:

a) Voids — Predominantly mega vughs and channels. Voids aligned with vessel walls. Mega vesicles also present. Few voids are filled with carbonised organic matter this organic material is likely to have been present in the parent clay.

b) C/f related distribution — Closed to open spaced

c) Preferred orientation — Poorly developed, although voids are aligned with vessel walls.

II Groundmass:

a) Homogeneity — This is a relatively homogenous group, characterised by coarse fragment of plutonic igneous rock fragments, mafic minerals – including hornblend and biotite altering to chlorite – and minerals with Wolds based origins (see below).

b) Micromass (material less than 0.01mm) **80%**

(i) Optical state — Highly optically active to weakly optically active

(ii) birefringent fabric — Bistrial b-fabric

(iii) colour

x40 in ppl: Brown-black to orange brown

x40 in xp: Light to dark orange brown

c) Inclusions:

i) c:f ratios

$c{:}f{:}v_{0.01mm}$ c.80:15:5 to c.60:30:10

Coarse Fraction 0.3mm to 2.0mm (medium sand to very coarse sand)

Fine Fraction 0.3mm and below (fine sand or less)

ii) texture

iii) composition

Coarse Fraction

Dominant: **Igneous rock**: el and eq, a-sr. <2.0mm, mode 1.2mm. Fragments are composed of coarse grained plagioclase and orthoclase feldspars feldspars – the plagioclase is commonly zoned and altering to sericite and clay – quartz, perthite, biotite mica – rarely altering to chlorite. Green hornblend is present in samples ELAJ60 and ELAJ63. Magnetite is also present in the fragments in sample ELAJ059. In ELAJ099 chlorite laths are developing along the weathered cleavage planes of feldspars. These clasts probably derive from a granodiorite. In sample ELAJ101 there is a single fragment of two-mica granite (see notes in 'Two mica Granit Group'.

Few: **Plagioclase feldspars:** a-sr, <1.0mm, mode 0.8mm, a few are zoned.

Few to very few: **Biotite mica**: el, laths <0.75mm, mode 0.5mm rarely altering to

chlorite (ELAJ065)
Hornblende: a-r <0.75mm, mode 0.5mm. In sample ELAJ059 0.25mm rounded grain.

Rare: **Opaques:** eq and el, sr <1.25mm, mode 0.15mm. Dark red brown in PPL (x40). Probably representing iron rich concretions within the clay (ELAJ080, ELAJ101).

Very rare to absent: **Clynopyroxene**: well formed rhombic crystal <1.5mm in sample ELAJ59.
Limestone: 0.5mm, mode 0.4mm, fine grain calcite crystals and medium grained radiaxial calcite (ELAJ63)
Calcareous sandstone: sa-r <0.5mm, quartz grains in calcite cement (ELAJ097 and ELAJ098, ELAJ0101). In sample ELAJ101 the sandstone contains fine to medium sr-r grains of brown stained glauconite.

Fine Fraction

Predominant to common: **Quartz**: sa-sr, <0.25mm, mode 0.125mm

Common: **Plagioclase feldspars:** el and eq, sa-sr, <0.25, mode 0.2.
Quartz: coarse silt sized

Few: **Calcite crystals:** <0.2mm (ELAJ60, ELAJ97, ELAJ98, ELAJ101). In ELAJ101 the calcite also contains iron stained algae.

Very rare to absent: **Goethite ooliths:** present in samples ELAJ059, ELAJ080, ELAJ097, ELAJ101. (relates to the local geology)
Glauconite: oolith present in ELAJ098 0.4mm diameter.

III Textural concentration features:

a) Tcf%: <5%

b) Note: Two tcfs noted in ELAJ065. Sharp to merging boundaries, rounded, equant, neutral optical density, concordant. Closed to open spaced silt sized grains (<10%). This silt fraction is the same as noted in the rest of the section. These grains represent clay that was Aplastic at the time of paste preparation.
ELAJ098 iron rich tcfs, sr- r, mode 0.5mm, red in PPL, neutral optical density, concordant, merging boundaries. Represents iron rich concretions in the clay.
ELAJ061 Tcfs account for c.20% of the coarse fraction. They range from neutral to very optically dense, in fact almost opaque in XP (x40). They have sharp to merging boundaries and contain closed to open spaced silt through to medium sand quartz grains ranging from 20-60%. They suggest that the medium sand sized grains were present in the parent clay prior to the igneous material being added (similar to sub fabric B).

Comments

This is an homogenous group, characterised by plutonic igneous rock that has been added as temper to a boulder clay. The potters formed these vessels by coiling – that is by joining successive rings, or coils of clay, one on top of the other. This is demonstrated by samples ELAJ060, ELAJ063 and ELAJ065, in which the shrinkage of the clay when drying has pulled the coil joins apart leaving diagonal voids running through the vessel wall, indicating the location of the coil-joins. The optical activity of the groundmass in these samples demonstrates that the potters were not firing their vessels to very high temperatures, probably in the region of 550-750^{o}C and certainly no higher than c.850^{o}C, and the presence of carbonised organic material in voids demonstrates that the vessels were not fired for a sufficient time to allow the organic material to fully burn out (Reedy 2008, 185-6; Tite 1995; Hodges 1963).

The coarse fraction, added to the clay as temper, is characterised by plutonic igneous rocks, the rounding and weathering of which demonstrates that they do not derive from freshly crushed rock.

Although few grains are seen to be angular, which might suggest crushing of larger fragments, this can be explained by the mode of transport - glacial action (see below) usually gives rise to angular fragments (Wardle 1992, 58) and it is likely that the temper derives from glacial sand deposits.

By examining the mineralogy of the inclusions in these samples it is possible to suggest the origin of the igneous rocks. The suite of minerals indicates that the most likely sources are the Criffel-Dalbeattie granodiorite of south-western Scotland, the Shap adamellite granite of Cumbria, and the Cheviot Hills granite of Northumberland. The Shap granite is characterised by rod and bead perthites, altered zoned plagioclase feldspars and biotite altering to chlorite, whilst the Criffel-Dalbeattie is characterised by green amphibole, altered and zoned plagioclase feldspars, perthite and altered biotite (Ixer and Vince 2009, 16-7). Most samples in this group contain zoned plagioclase feldspars and biotite which is altering to chlorite, suggesting a Shap or Criffel-Dalbeattie origin, whilst green amphibole, characteristic of the Criffel-Dalbeattie granite, is seen in ELAJ060 and ELAJ063. The Cheviot Hills granite is pyroxene bearing (Ixer and Vince 2009, 14) and in agreement pyroxene is noted in ELAJ59.

The numerous glaciations that brought material from south western Scotland, the Lake District and Northumbria explain the presence of this lithology in these samples. Granites from south-west Scotland (the Criffel-Dalbeattie) and the Shap were carried southwards through the Vale of York by pre-Devensian ice flows, whilst a second ice flow carried the same Scottish material (the Criffel-Dalbeattie) through into Northumbria and then southwards along the east coast. In passing though Northumbria this latter flow picked up material from the Cheviot Hills, including the pyroxene bearing granite. These materials were deposited by the glaciers, and their associated melt-waters, in the in the various Pleistocene and Devensian tills and sand and gravel deposits in North Lincolnshire. They were therefore freely available as a source of raw material to the early Anglo-Saxon potters. The Devensian till, which contains the Cheviot Hills material flanks the eastern edge of the Wolds, rises up on to the Wolds and is know just east of Melton Ross (just a few kilometres east of Elsham), whilst pre-Devensian and Devensian deposits are situated along the Wold's western slope and the eastern edge of Jurassic limestone scarp in the Ancholme Valley (Wilson 1971, 72, 79-80; Gaunt *et al.* 1992, 109-123; Ixer and Vince 2009, 14).

The clays represented in these samples were probably obtained from exposures in close proximity to the tempering materials, and certainly within a few kilometres of Elsham. The goethite ooliths noted in samples ELAJ59, ELAJ80, ELAJ97 and ELAJ101 are characteristic of the Claxby Ironstone, which outcrops along the western edge of the Lincolnshire Wolds. Notably, this deposit weathers to form reddish brown clayey soils with shiny ooliths and is known in exposure north-east of Audleby, around Nettelton Top, Normanby le Wold and Claxby. This ironstone overlays the calcareous Spilsby sandstone, also in exposure at Aubleby – and this would agree with the calcareous inclusions seen in samples ELAJ60, ELAJ97, ELA98 and ELAJ101 (Gaunt et al. 1992, 69-73). It is also worth mentioning that the Devensian till on the east of the Wolds drained in to the Ancholme Valley, close to Melton and Barnetby (Straw and Clayton 1979, 30-1). As the melt-waters flowed into the Ancholme, they passed over the Elsham Sandstone which crops out at Barnetby and Elsham (see also Elsham Calcareous Sandstone Group); this would account for the calcareous sandstone seen in these samples. Accordingly, Gaunt *et al*. (1992, 122-3) note that glacial sands and gravels between Melton Ross and Barnetby are similar in lithological composition the Devinsian till on the east of the Wolds. This would also offer an explanation for the calcareous material seen alongside the igneous lithics in these samples.

Although the Cleatham Granitic Group also contains igneous materials from the Criffel-Dalbeattie and the Shap granite, this Elsham group is separable on account of accessory minerals (e.g. calcareous sandstone, iron rich ooliths and Cheviot Hills derived pyroxenes). The minerals are characteristically Wolds based and they are they are absent in the Cleatham granitic group. Conversely, there are a range of lithologies present in the Cleatham group, that are characteristic of geology west of the Wolds, that are conspicuous in their absence from this Elsham group (e.g. kaolinite cemented sandstone and fossiliferous limestone – see Cleatham Granitic Group).

Related Sections

Sub Fabric A

Sample ELAJ99

This sample is clearly related to the main group in that it is characterised by the inclusion of coarse gained acid igneous rock fragments. The composition of these fragments is the same as discussed above, with perthite, zoned plagioclase, magnetite, altered feldspars and biotite all being present. In this case, however, the igneous material has been added to sandy clay. The fine fraction accounts for 60% of inclusions and comprises dominant sr-r quartz, common to few polycrystalline quartz grains with fine sutured grains, rarely chert and very rarely microcline feldspar. The composition of the fine fraction suggests that we might be dealing with glacially deposited clay. Again these are available close Elsham (see notes above).

Sub Fabric B

Sample ELAJ62

Again this sample contains the same suite of minerals as the main group. In this instance, however, the sample contains common fragments of grog what appears to be grog. The grog contains the same suit of mineral as is in the main clay body. Thus, it appears that an pot of the same fabric was crushed and added to the clay as temper.

Sub Fabric C

ELAJ97. As noted above the material representing in this sample is the same as that seen in the rest of the group, yet the igneous inclusions present in this samples are considerable more angular. They may represent material that has been crushed prior to its addition to the clay.

Sub Fabric D

Sample ELAJ057, ELAJ124

These sample is separable from the main group on account of its higher firing temperature and the higher ferromagnesian mineral content in the fine fraction. Indeed, in this sample silt sized biotite accounts for c.50% of the fine fraction whilst brown amphibole accounts c.5% . The sample also contains calcite crystals and calcareous sandstones similar to those noted in the main group.

Sub Fabric E

Sample ELAJ64

Again this sample is characterised by the inclusion of sa-sr coarse grains of plutonic igneous rock. In this instance, however, these materials are set within a very silty clay. The matrix accounts of c50% of the paste with a c:f:v of 50:48:2.

Fabric Group Name: **Elsham Limestone Group**
Samples: GP009, ELAJ034, ELAJ127
Sub Groups:
Cemetery-cemetery
Cemetery-settlement

I Microstructure:

a) Voids	Meso vugh and channels – carbonised deposits noted in voids in ELAJ034
b) C/f related distribution	Open spaced
c) Preferred orientation	None

II Groundmass:

a) Homogeneity	Relatively heterogeneous group due to the varying frequency of the limestone temper.
b) Micromass (material less than 0.01mm)	**80-90%**
(i) Optical state	Slightly to highly optically active
(ii) birefringent fabric	b-fabric
(iii) colour	
x40 in ppl:	Brown black to orange-red brown
x40 in xp:	Dark red-brown to golden-orange red
c) Inclusions:	
i) c:f ratios	
$c{:}f{:}v_{0.01mm}$	c.15:80:5 to 80:5:5
Coarse Fraction	Medium sand to granules (0.25mm to 2.0mm)
Fine Fraction	Fine sand and below (0.25mm to 0.01mm)
ii) texture	
iii) composition	

Coarse Fraction

Common	**Limestone**: Biosparite, sr, < 2.5mm, mode 0.75mm, composed primarily of fine to coarse grained micritic peloids, micritised shell, rarely ooliths, and characteristically, bioturbation burrows and worm tubes. Transverse sections of a worm tubes are noted and the outer layers of which are micritised but the inners are filled with crystals of well formed calcite. Micritised foraminifera were also present in ELAJ127.
Few to Absent:	**Chert**: sa-wr, eq and el, <2.5, mode 1.5mm. The chert is entirely radiolarian and only present in ELAJ034.
Very Rare to Absent	**Quartz:** el, sa, 0.8mm, in ELAJ127 only, monocrystalline with undulose extinction.
	Opaques: single sa el 0.75 in ELAJ34

Fine Fraction

Predominant to common	**Quartz**: Fine sand to silt sized
Common	**Opaques:** silt sized in GP009 only

III Textural concentration features:

a) Tcf%:	<10% in ELAJ127
b) Note:	Sharp to merging boundaries. Neutral to slightly more optically dense. Prolate, sa, <2.5mm, mode 1.6mm. Contains same silt sized fraction as in the rest of the matrix.

Comments:

This is a relatively homogenous group, characterised by the limestone fragments which have been added to a very fine clay (GP009 and ELAJ127 are more silty than ELAJ034). No coil joins are evident, although this does not tell us that the pots were not coil built; it is more likely that the samples were not selected from the points at which coils were joined. The optical activity of the groundmass in these samples demonstrates that the potters were not firing their vessels to very high temperatures, probably between 550-750 °C and certainly no higher than c.850°C, and the presence of carbonised organic material in voids in ELAJ034 demonstrates that the vessels were not fired for a sufficient time to allow the organic material to fully burn out (see Reedy 2008, 185-6; Tite 1995; Hodges 1963).

The limestones in these samples are separable from the Cleatham material on account of their composition. Where the Cleatham samples contained well preserved fossils, the fossil remains in these limestones are completely micritised. In addition limestone in these samples also contain numerous worm tubes, bioturbation burrows and micritic peloids set in a matrix of well formed very fine to fine sand sized calcite crystals. These are characteristics of the Cretaceous Tealby Limestone, which is located on the Lincolnshire Wolds (Gaunt *et al*. 1992, 74). Significantly, this limestone crops out at Nettleton, c.14km south of Elsham (Gaunt *et al*. 1992, 75). As the glaciers which moved much material through Lincolnshire moved southwards, it is unlikely that that this material was transported north towards Elsham and then utilised by northern potters. As such we are left with the possibilities that human action carried the raw materials for potting northwards, or that the pre-fabricated pots themselves were moved northwards. Given that evidence from the other petrographic groups suggests that pots were moving extensively throughout the Lincolnshire landscape, this author favours the latter explanation.

Related Sections

Fabric Group Name:	**Elsham Sand Group**
Samples:	ELAJ019, ELAJ020, ELAJ024, ELAJ025, ELAJ046, ELAJ052, ELAJ053
Sub Groups:	
Cemetery-cemetery	
Cemetery-settlement	

I Microstructure:

a) Voids	Messo to mega channels caused by the shrinkage of clay. Rare mega-voids with carbonised organic material. The variation in size and shape of these organics suggest that they were in the clay rather than being added as temper.
b) C/f related distribution	Single to open spaced
c) Preferred orientation	Channels arranged parallel to margins

II Groundmass:

a) Homogeneity

b) Micromass (material less than 0.01mm) **75%**

(i) Optical state	Slightly to highly optically active.
(ii) birefringent fabric	b-fabric
(iii) colour	
x40 in ppl:	Orange brown
x40 in xp:	Brown orange

c) Inclusions:

i) c:f ratios

$c{:}f{:}v_{0.01mm}$	c.80:5:5
Coarse Fraction	Medium to very coarse sand (0.25 to 1.5mm)
Fine Fraction	Fine sand and below (0.25mm to 0.01mm)

ii) texture

iii) composition

Coarse Fraction

Common	**Quartz:** sa-wr, eq and el, <1.5mm, mode 0.6mm, monocrystalline, undulose extinction, traversed by cracks, vacuoles.
Very Few to Absent:	**Chert**: r-wr, eq and el, <0.8mm, mode 0.5mm, including chalcedony.
Very Rare to Absent:	**Iron ooliths**: ooliths and oncoliths, <0.5mm (ELAJ053)
	Quartz: sa-wr, eq and el, <0.8mm, mode 0.4mm, polycrystalline, fine grained sutured boundaries.
	Microcline feldspar: sa-wr, eq and el, <0.8mm, mode 0.4mm, polycrystalline, fine grained sutured boundaries.

Fine Fraction

Predominant	**Quartz**: fine sand to silt sized, monocrystalline
Common	**Quartz**: fine sand sized polycrystalline
	Qpaques: silt sized
Few-very few	**Mica**: silt sited, probably muscovite

III Textural concentration features:

a) Tcf%: None

b) Note:

Comments

This is a very homogenous group, characterised by coarse grained sand which has been added as temper to a relatively fine, probably, boulder clay. The potters formed these vessels by coiling – that is by joining successive rings, or coils of clay, one on top of the other, evidenced by a void running diagonally across vessels wall in sample ELAJ046 and the preferred orientation of the inclusions along the boundary of this join. The optical activity of the groundmass in these samples demonstrates that the potters were not firing their vessels to very high temperatures, probably in the region of 550-750^{o}C and certainly no higher than c.850^{o}C, and the presence of carbonised organic material in voids demonstrates that the vessels were not fired for a sufficient time to allow the organic material to fully burn out (Reedy 2008, 185-6; Tite 1995; Hodges 1963).

The mineralogy in these samples agrees with the geology around the site from which they derive. The well rounded quartz and chert, including chalcedonic chert, is characteristic of the Cretaceous Spilsby Sandstone, located on the Lincolnshire Wolds. The presence of oolitic ironstone in these samples also agrees with a Wolds based origin (see Oolitic Ironstone Group, Very Coarse Well Rounded Quartz and Chert Group). This group is very similar to the Very Coarse Well Rounded Quartz and Chert Group. It is separable, however, on account of the grain size and other mineral present in the quartz grains. Samples within the latter group all contain quartz and chert with modal grain size of 1.0mm, with grains commonly reaching 2.5mm. The modal size in the present group, however, is less, being 0.5mm and rarely reaching 1.5mm. Furthermore, the quartz grains in the latter group often contain rutile and zircon; these mineral are absent in the present group.

Fabric Group Name:	**Glacially Derived Sandstone Fabric Group**
Samples:	MT005, MT037, MT075, MT077, MT079, MT080, MT081, MT083, MT087, MT102, MT103, MT140, MT144, MT145, MT146, MT147, MT148, MT151, MT154, MT155, MT157, MT158, MT160, MT161, MT162, MT164,MT166, MT168, MT169, MT170,MT190, GP004, GP026, GP038, GP061, GP073, GP078, GP082, GP086, GP092, GP102, GP108, GP111, ELAJ085.
Sub Groups:	Main Group: MT037, MT075, MT077, MT079, MT080, MT081, MT083, MT087, MT102, MT103, MT140, MT144, MT145, MT147, MT154, MT155, MT157, MT158, MT160, MT162, MT166, MT168, MT190, GP004, GP026, GP038, GP061, GP073, GP078, GP082, GP086, GP102, GP108, GP111, ELAJ085 Sub Group A: MT005, MT146, MT148, MT151, MT161, MT164, MT169, MT170,GP092
Cemetery-cemetery	ELAJ085=MT075, MT080, MT144.
Cemetery-settlement	GP072, GP082, GP086 = MT075, MT080, MT144 = ELAJ08 GP073 = MT154
Settlement-settlement	GP079 = GP078 = GP108

I Microstructure:

a) Voids	Predominantly meso planar voids and channels, commonly mega vughs contained burnt organics and rarely vughs formed by the shrinkage of clay along coil joins.
b) C/f related distribution	Closed to open spaced
c) Preferred orientation	Crudely aligned with vessel walls.

II Groundmass:

a) Homogeneity	Very homogenous group characterised kaolinite cememted sandstone added as temper to boulder clay.

b) Micromass (material less than 0.01mm) **60-80%**

(i) Optical state	Slightly to highly optically active
(ii) birefringent fabric	b-fabric
(iii) colour	
x40 in ppl:	Dark orange brown, to near opaque dark brown
x40 in xp:	Orange brown to dark brown black

c) Inclusions:

i) c:f ratios

$c{:}f{:}v_{0.01mm}$	c.80:10:10 to c.65:25:10
Coarse Fraction	Fine sand to very coarse sand (0.125mm to 1.25mm)
Fine Fraction	Very fine sand and below (0.125 to 0.01mm)

ii) texture

iii) composition

Coarse Fraction

Common:	**Quartz**: monocrystalline sa-sr, eq and el, <1.2mm, mode 0.5mm, commonly showing undulose extinction, rarely with vacuoles in both random and linear arrangements. **Sandstone**: coarse to fine grained, eq and el, a-sr, <1.25mm, mode 0.6mm. Comprising sr-sa eq and el coarse to fine grained quartz in a kaolinite cement.
Common to Few:	**Quartz**: polycrystalline, eq and el, sa-r, <0.75mm, mode 0.4mm, both medium and fine grained with sutured grain boundaries.

Opaques, sr-a, eq and el, <1.25mm, mode 0.4mm, rarely containing silt sized grains of quartz

Few — **Plutonic igneous rock fragment**: eq and el, sa-sr < 1.25, mode) 0.6mm, comprising zoned plagioclase, orthoclase and microcline feldspars. All are commonly weathering to white mice and clay. Rarely do samples contain amphibole, both tabular and prismatic.

Very Rare to Absent: — **Calcareous sandstone**: <0.9mm, composed of medium to fine sr-sa quartz grains (MT103)

Sandstone: <1.25mm, mode 0.7mm, quarts grains set in a silaceous cement.

Microcline feldspars: sr-sa, eq and el, <0.7mm, mode 0.4mm

Muscovite mica: tabular laths <0.7mm (MT144)

Perthite: sr-sa, eq and el, <0.7mm (MT162)

Chert: chalcedonic eq and r, <0.75, mode 0.4mm

Hornblende: el and eq, sa-sr, tabular and prismatic, simply twinned

Dolerite: eq and el sa-a <0.5mm. Ophytic texture, composed of medium grains of plagioclase feldspars enclosed in augite.

Biotite: tabular laths, <0.7mm

Quart feldspar intergrowths: sr, 0.4mm with micrographic texture (MT155)

Fine Fraction

Predominant-common — **Quartz**: very fine sand and silt sized grains

Few-very few — **Opaques**: fine sand to silt sized laths

Mica: silt sized laths

III Textural concentration features:

a) Tcf%: <5% sharp boundaries, equant, sr-a, high optical density, discordant, dark red brown in xp and brown black in ppl (x40). These represent iron rich concretions in the parent clay (MT080, GP078, MT158). Containing open spaced silt sized quartz grain.

b) Note:

Comments

This is a very homogenous group, characterised by fine to coarse grained sandstone that has been added to as temper to a relatively fine boulder clay. The potters formed these vessels by coiling – that is by joining successive rings, or coils of clay, one on top of the other. This is demonstrated by sample MT145, in which two coils, one in which is well tempered and the other poorly tempered, are beside one-another. The junction of well tempered and poorly tempered clay indicates the location of the coil-join. The optical activity of the groundmass in these samples demonstrates that the potters were not firing their vessels to very high temperatures, probably in the region of 550-750^{o}C and certainly no higher than c.850^{o}C, and the presence of carbonised organic material in voids demonstrates that the vessels were not fired for a sufficient time to allow the organic material to fully burn out (Reedy 2008, 185-6; Tite 1995; Hodges 1963).

The join between a coil of well tempered and a coil of sparsely tempered clay and the tcfs demonstrate that the coarse fraction was added to the clay as temper. The consistent grain-size sorting of the sandstone, plutonic igneous fragments, and iron opaques, suggests that the potters were probably obtaining their temper from a glacial deposit, probably a sand, and that all these lithologies were present in that source. Some grains do show signs of having being crushed, indicated by the angularity of some sandstone fragments, which might suggest that sand was prepared by grinding before being added to the clay as temper – although as Wardle (1992, 58) notes, glacial action usually gives rise to angular fragments. Sampling of North Lincolnshire's glacial deposits might help to determine the character and thus resolve this problem.

The range of inclusions noted in these samples is of considerable interest as almost none can be attributed with a local origin. The sandstones with kaolinite cement (which contain muscovite laths) and overgrown quartz grains are characteristic of sandstones found in the Pennines and the Vale of York (see for example Vince 2006). The ferromagnesian minerals such as hornblende and biotite, along with the various feldspars and micrographic and perthitic intergrowths, suggest igneous formations from the south-west of Scotland and the Pennines (see Elsham and Cleatham Granite Groups and the Two-Mica Granit Group, for a discussion of the mineralogy and origins of the various plutonic igneous clasts), whilst the dolerite probably derives from the Cheviot hills (see Dolerite Group). As discussed in the petrographic description of the Elsham and Cleatham Granite Groups, pre-Devensian and Devensian glaciers from the south-west of Scotland travelled south, through the Pennines, into the Vale of York, across the Humber and they, and they and their associated melt-waters deposited materials in the Trent and Ancholme Valleys. Notable, the eastern edge of Lincoln Edge (see Figure 1.1) is flanked by Devensian and pre-Devensian deposits (Wilson 1971, 72, 79-80; Gaunt *et al.* 1992, 109-123; Ixer and Vince 2009, 14). Therefore, there are numerous glacial deposits in North Lincolnshire which would account for the suit of minerals and lithologies noted in these samples. The homogeneity of this group, however, suggests that the potters were probably exploiting just a single deposit.

Related Sections

Sub Fabric A:

MT005, MT146, MT148, MT151, MT161, MT164, MT169, MT170,GP092

This group contains the same suite of minerals as notes in the main group. The clay to which these clasts have been added, however, is very ‘clean’; it is highly birefringent and appears orange red in XP. It is very similar to the clay of samples belonging the Medium Sandstone Petrographic Group.

Fabric Group Name: **Granitic Sandstone**

Samples: MT139, GP001, GP050

Sub Groups:

Cemetery-cemetery

Cemetery-settlement MT139=GP050

I Microstructure:

a) Voids: Meso channels and vughs to macro vughs and vesicles.

b) C/f related distribution: Single to open spaced

c) Preferred orientation: GP001 and GP050 vughs and coarse fraction aligned along coil joins.

II Groundmass:

a) Homogeneity: Homogenous group

b) Micromass (material less than 0.01mm) **60%**

(i) Optical state: Slightly optically active

(ii) birefringent fabric: b-fabric

(iii) colour

x40 in ppl: Orange brown to brown black

x40 in xp: Orange brown to brown black

c) Inclusions:

i) c:f ratios

$c:f:v_{0.01mm}$: c.60:35:5

Coarse Fraction: Fine sand to granules (0.125mm to 2.3mm)

Fine Fraction: Very fine sand and below (0.125mm and below)

ii) texture

iii) composition

Coarse Fraction

Dominant: **Quartz**: monocrystalline, sa-sr, eq, <1.0mm, mode 0.3mm. Rarely showing undulose extinction, larger grains traversed by vacuoles and few contain zircon crystals. Grains derive from crushed sandstone added as temper.

Common: **Sandstone**: a, eq, <2.25mm, more 1.2mm. Composed of sa-sr quartz, mode 0.3mm, muscovite mica, weathered plagioclase and microcline feldspars, and augite. In GP001 also contains biotite. Should be classified as a volcanic arenite.

Few: **Opaques:** sa-sr, eq, <0.5mm, mode 0.3mm

Very Rare to Absent: **Feldspars**: microcline, orthocasle and plagioclase, weathered. Plagioclase altering to sericite, a-sr, < 1.25mm, mode 0.3mm.
Perthite: a <1.2mm in GP001.
Basalt: el, a-sr, <3.5mm**.** Fine gained. Only in GP001

Fine Fraction

Predominant: **Quartz**: silt sized

Few-very few: **Feldspars:** microcline, plagioclase and orthoclase, very weathered
White mica: silt sized
Opaques: silt sized

III Textural concentration features:

a) Tcf%: None

b) Note:

Comments

This is a relatively homogenous group characterised by fragments of sandstone, the angularity of which suggests that they were crushed before being added to the clay as temper to ferruginous boulder clay. These sandstones are highly distinctive, being composed of quartz, muscovite mica, weathered plagioclase and microcline feldspars, and augite. The potters formed these vessels by coiling – that is by joining successive rings, or coils of clay, one on top of the other. This is demonstrated in all samples with shrinkage of the clay when drying having pulled the coil joins apart leaving diagonal voids running through vessel walls, indicating the location of the join. The optical activity of the groundmass in these samples demonstrates that the potters were not firing their vessels to very high temperatures, certainly no higher than c.850^{o}C, and the presence of carbonised organic material in voids demonstrates that the vessels were not fired for a sufficient time to allow the organic material to fully burn out (see Reedy 2008, 185-6; Tite 1995; Hodges 1963).

The source of this sandstone is puzzling; its texture and mineralogy suggest that it developed from the compaction and cementation of the weathered grains of an augite bearing plutonic igneous rock. As no such rocks are known to constitute the solid geology of the study area it is possible that they were present in the glacial deposits that cover much of the area. Russel (1984, 536) has commented that a great deal of this type of sandstone is seen in thin sections of pottery from East Anglia. Such sandstones are present in the glacial tills of the area. Russel suggests that they might have a northern English origin, but admits that the ultimate source is unknown. Without comparing these thin sections with Russel's, it is impossible to ascertain whether these vessels might have been 'imported' to North Lincolnshire. Certainly, there are no other clasts in these samples that might hint at a local source. Further work is needed on the these samples.

Fabric Group Name: **Grog Group**

Samples: MT064, MT071, MT121, MT135, MT172, GP096

Sub Groups:
Cemetery-cemetery
Cemetery-settlement

I Microstructure:

a) Voids — Macro to mega vughs and channels. Channels are the result of clay shrinkage; vughs are the result of organic material, probably in the parent clay, that burnt out on firing.

b) C/f related distribution — Open spaced

c) Preferred orientation — Channels aligned with margins and are the result of shrinkage of clay.

II Groundmass:

a) Homogeneity

b) Micromass (material less than 0.01mm) **70-80%**

(i) Optical state — Highly optically active

(ii) birefringent fabric — Bi-fabric, grano striated

(iii) colour

x40 in ppl: Orange brown to dark-brown black

x40 in xp: Dark-brown black to red brown and orange brown

c) Inclusions:

i) c:f ratios

$c{:}f{:}v_{0.01mm}$ c.90:5:5 to c.65:25:10

Coarse Fraction: Coarse sand to granules (0.6mm to 4.0mm)

Fine Fraction: Medium sand and below (0.6mm to 0.01mm)

ii) texture

iii) composition

Coarse Fraction

Common

Grog fragments: sr-a, el and eq, <4.0mm, mode 1.0mm. Orange brown to grey black and black in XP (x40). Groundmass highly to optically inactive (MT172), closed to open spaced coarse faction composed of sr-r eq and el coarse to fine sand sized monocrystalline quartz, rare chert, polycrystalline quartz – fine to medium grained with sutured boundaries, weathered plagioclase, microcline (MT0121) quartz feldspar intergrowths with myrmekitic texture (MT172). Fine fraction absent in some grog fragments, in others the fine fraction is composed of medium sit sized quartz and white mica.

Quartz: eq and el, sa-r, <1.5mm, mode 0.5mm, monocrystalline. In MT135 the grains frequently show signs of overgrowth and are related to a medium to coarse grained sandstone, of which there are fragments within the coarse fraction.

Few to Absent:

Calcareous sandstone fragments: eq and el, sa – s, <0.75mm, mode 0.4mm. Comprising fine to medium grained quartz, sr-sa, monocrystalline with undulose extinction and rarely r eq coarse grained polycrystalline quartz - fine to medium grained with sutured boundaries.

Very rare to absent: **Sandstone:** eq and el, sr-sa, <4.0mm, mode 0.8mm. Medium to coarse grained quirtz with overgrown boundaries, set in a kaolinite cement (Vale of York SST) (MT135 only)

Plutonic igneous fragment: eq, sr, 4.0mm, composed of coarse grained quartz and biotite (MT135 only).

Micaceous Siltstone: sa, el, 1.0mm single fragment in MT135.

Plagioclase Feldspar: eq and el, sr-sa, <1.0mm, mode 0.8mm.

Opaques: sr –sr, eq and el, <0.75mm (MT071, MT172)

Fine Fraction

Predominant to common **Quartz**: sr, eq and el, <0.6mm

Common **Quartz**: silt sized grains

Opaques: silt sized grains

Whilst mica: probably muscovite and chlorite, silt sized laths (MT173 only – absent in other samples)

Very few-Absent **Calcite:** fine grained crystals deriving from the calcareous sandstone noted above (MT135 only)

III Textural concentration features:

a) Tcf%:

b) Note:

Comments

This is a heterogeneous group, characterised by crushed fragment so pottery added to clay as temper. The optical activity of the groundmass in these samples demonstrates that the potters were not firing their vessels to very high temperatures, probably in the region of 550-750°C and certainly no higher than c.850°C, and the presence of carbonised organic material in voids demonstrates that the vessels were not fired for a sufficient time to allow the organic material to fully burn out (Reedy 2008, 185-6; Tite 1995; Hodges 1963).

The clay from which samples were produced were probably obtained form a number of sources. Samples MT121 and MT135 in a very fine, possibly Jurassic clay, whilst samples MT064, MT071, MT172 have considerably more silt and mica in the clay background. Lithology and the optical activity (suggesting low firing temperatures) of the grog fragments suggest the grog derived from other Anglo-Saxon pottery. It is difficult to suggest a geographical/geological source for these samples as it is the grog that is the main tempering agent. What can be said, however, is that these samples are unlikely to have been 'imported' from another area of the country. Indeed, although rare, the accompanying lithological clasts are in keeping with the geology of the study area, for example, calcareous sandstone, igneous erratics, and iron rich opaques.

Sub Fabric A

GP096

This sample is separable on account of the parent clay. The clay is clearly a boulder clay, with poorly sorted, fine to very coarse grains, including the sandstone described above, weathered plagioclase and dolerite (see dolerite group). The grog added to these samples is also of note. Fragments are optically inactive indicating that they have been fired to a high temperature – this is in contrast to the low fired optically active groundmass in which the grog is set. The grog fragments are grey-black in PPL and isotropic in XP. In particular, a single fragment demonstrates that pottery from which the grog derived had oxidised margins and a reduced core. It is possible that the grog derives from a Roman vessel.

Related Sections

Fabric Group Name:	**Medium Sandstone Group**
Samples:	MT006, MT010, MT070, MT072, MT078, MT134, MT136, MT141, MT143, MT150, MT156, MT163, MT165, MT189, GP027, GP049, GP056, GP060, GP071, ELAJ089, ELAJ111.
Sub Groups:	Main Group: MT006, MT134, MT136, MT141, MT156, GP027, GP049. Sub Group A: MT070, MT078, MT165, MT189, GP056, GP060, GP071, ELAJ089. Sub Group B: MT072, MT143, MT150, ELAJ111. Sub Fabric C: MT010, MT163.
Cemetery-cemetery	ELAJ089 = MT070, MT078, MT0165, MT189. ELAJ111=MT150.
Cemetery-settlement	MT136=GP027. GP071 = ELAJ089 = MT070, MT078, MT0165, MT189.

I Microstructure:

a) Voids	Meso and macro vughs and channels.
b) C/f related distribution	Closed to open spaced.
c) Preferred orientation	Voids crudely aligned with vessel walls, due to shrinkage of the clay.

II Groundmass:

a) Homogeneity	Very homogenous group characterised by fragments of a medium grained sandstone with ferruginous cement and rare limestone clasts.

b) Micromass (material less than 0.01mm) **60-70%**

(i) Optical state	Slightly to highly optically active
(ii) birefringent fabric	b-fabric

(iii) colour

x40 in ppl:	Brown black to pale orange brown
x40 in xp:	Dark orange brown

c) Inclusions:

i) c:f ratios

$c:f:v_{0.01mm}$	c.93:2:5 to c.85:7:8
Coarse Fraction	Fine sand to very coarse sand (0.125mm to 1.2mm)
Fine Fraction	Very fine sand and below (0.125mm and below)

ii) texture

iii) composition

Coarse Fraction

Common:	**Quartz**: sr- sa, eq and el, <0.6mm, mode 0.3mm. Monocrystalline with undulose extinction. Deriving from the sandstone noted below.
Common-Few:	**Sandstone:** fragments composed of sa-sr eq and el medium grained quartz, showing undulose extinction, very rare orthoclase feldspars in an iron rich cement. This should probably be described as a quartz-arenite.
Very Few:	**Quartz**: ea and el, wr, <1.2mm, mode 0.9mm **Calcite**: eq and el, moderately well formed crystals, <0.5, mode 0.3mm. Deriving from the calcarouse sandstone noted below. **Calcareous Sandstone**: <1.2mm, mode 0.5mm, calcareous sandstone fragments comprising medium sa-sr eq and el quartz and coarse wr quartz in a calcite cement.
Very Rare to Absent:	**Chert**: wr eq and el, <1.2mm, mode 0.9mm. **Quartz**: wr eq and el, <1.2mm, mode 0.7mm, polycrystalline, fine to medium grained with sutured grain boundaries.

Metamorphic rock: sr-r grains of metamorphic rock <0.4mm, mode 0.3mm, composed of fine grained quartz with sutured boundaries, biotite and muscovite mica.
Opaques; eq and el, sr-sa, <1.2mm, mode 0.3mm, rarely containing silt sized quartz grains.
Muscovite: laths 0.5mm (MT134).
Fossiliferous limestone: single fragment, sa, 0.7mm, in MT136 containing brachiopod shell fragment. Ribbed impunctate brachiopod shell in MT134. Brachiopods seen in GP027.
Limestone Oolith: single oolith in sample GP027, 0.9mm diameter, shell fragment at centre.
Microcline feldspar: wr eq 0.7mm (MT006).

Fine Fraction

Predominant	Quartz: silt sized
Common	Opaques: silt sized
Few-very few	Muscovite mica: silt sized laths

III Textural concentration features:

a) Tcf%: <5% in MT141, MT006, MT136

b) Note: Sharp to merging boundaries, sub-rounded to sub-angular, optically dense, concordant, dark red brown to black in PPL and red-black in XP (x40). Iron rich concretions in the clay paste. The tcf contains open spaced silt sized quartz and muscovite indicating that they were present in the parent clay.

Comments

This is a very homogenous group, characterised by fine to medium grained sandstone that has been crushed added as temper to a relatively fine boulder clay. The optical activity of the groundmass in these samples demonstrates that the potters were not firing their vessels to very high temperatures, probably in the region of 550-750^{o}C and certainly no higher than c.850^{o}C, and the presence of carbonised organic material in voids demonstrates that the vessels were not fired for a sufficient time to allow the organic material to fully burn out (Reedy 2008, 185-6; Tite 1995; Hodges 1963).

The angularity of the sandstone fragments that characterise this group demonstrates that it was crushed prior to being added to the clay as temper. The clay itself is likely to be a boulder clay; this is demonstrated by the poor sorting of the accessory lithologies. Indeed, rounded, medium to coarse sand sized grains of mono and polycrystalline quartz, chert and rounded microcline feldspars, occur alongside muscovite mica, fossiliferous limestones, sub-rounded fragments of calcareous sandstone and rounded grains of metamorphic rock.

All but two samples in this group derive from sites on the west of the River Ancholme, and it is encouraging to find that a medium grained, ferruginous quartz-sandstone, the Northampton Sand, is located in close proximity to these sites (Gaunt *et al.* 1992, 44-5). This sandstone is friable, which would account for the high frequency of disaggregated grains in comparison to the fragments of sandstone itself. Geological sampling would be required to confirm this as the ultimate source of the sandstone, but it certainly offers a realistic raw materials source.

There are other a number of other sandstone groups identified in this study (the Glacially Derived Sandstone Fabric Group, form Cleatham, and the Elsham Glacial Sands/Sandstone Group). This group is separable from the other two on account of the character of the sandstone and the suit of accompanying mineralogy. In the first instance, the quartz grains in the sandstone in this group are well sorted, medium grained and set within a ferruginous, probably haematite cement. In contrast the grains in the sandstones of the Glacially Derived Sandstone Fabric Group are poorly sorted, fine to very coarse, and set within a kaolinite cement. The sandstones in the Glacially Derived Sandstone

Fabric Group are also accompanied by coarse grained fragments of plutonic igneous rock – notably these inclusions are absent from the samples in this group. The Elsham Glacial Sands/Sandstone Group also contains plutonic igneous rock fragments, which separate it from the group under discussion. In addition, the sandstones in the Elsham Glacial Sands/Sandstone Group are extremely varied and derive from numerous sources, whilst those in this group are extremely homogenous and derive from a single source.

Related Sections

Sub Group A

MT070, MT078, MT165, MT189, GP056, GP060, GP071, ELAJ089

These samples are separable from the main group on account of a lack of calcareous material. The sandstone fragments are also slightly coarser, with crushed fragments up to 2.0mm. Rare voids containing the remains of carbonised organic matter are also present. In sample GP060 tcf account for are common. They are optically neutral to slightly optically dense, rounded, and discordant. They are inclusionless but for the same silt sized faction present in the rest of the clay. They demonstrate that the entire coarse faction was added as temper to a very fine clay.

Sub Group B

MT072, MT143, MT150, ELAJ111.

Samples in this sub group are lacking in the calcareous material noted in the main group and in this case the tempering material has been added to a silty clay.

Sub Group C

MT010, MT163

These samples are also lacking the calcareous component, again the sandstones are crushed, but in this instance they have been added to a clay that has almost no silt sized fraction.

Fabric Group Name: **Oolitic Ironstone Group**

Samples: ELAJ014,ELAJ030, ELAJ041, ELAJ042, ELAJ043, ELAJ044, ELAJ092, ELAJ117, ELAJ118, MT013, GP042

Sub Groups:

Cemetery-cemetery ELAJ117=MT013

Cemetery-settlement

I Microstructure:

a) Voids — Predominantly micro vughs and rarely mega channels and mega vughs. The mega channels and vughs rarely contain the remains of carbonised vegetal matter. Voids are closed to open spaced.

b) C/f related distribution — Closed to open spaced

c) Preferred orientation — Poorly developed although mega voids and mega vughs are seen to be aligned with the vessel walls. Remnant coil joins seen in MT013 from the orientation of coarse fraction.

II Groundmass:

a) Homogeneity

b) Micromass (material less than 0.01mm) 70-80%

(i) Optical state — Slightly optically active to optically inactive (ELAJ41 – this is dues to the reduction firing and remnant carbon – the section is black in ppl x40)

(ii) birefringent fabric — Mosaic speckled to stiple speckled b-fabric

(iii) colour

x40 in ppl: Deep red-brown to red-brown

x40 in xp: Red-brown to black golden-red

c) Inclusions:

i) c:f ratios

$c:f:v_{0.01mm}$ c.5:90:5 to 20:75:5

Coarse Fraction: Medium Sand to Granules (0.3mm to 2.5mm)

Fine Fraction: Fine Sand or less (0.3mm and below)

ii) texture

iii) composition

Coarse Fraction

Frequent — **Quartz:** moncrystalline, eq and el, sr-wr, medium sand sized to granules <2.5mm, mode 1.0mm, frequently with undulose extinction and with vacuoles both randomly and linearly arranged (Frequent in ELAJ117, MT013, ELAJ43, ELAJ14, ELAJ44, absent in ELAJ41, ELAJ42, ELAJ90, few in ELAJ118, ELAJ, 30, ELAJ92). Commonly traversed by micro-cracks, some of which are iron stained. Very rarely do they contain zircon crystals. Commonly these grains can be seen to contain vacuoles, both randomly and linearly arranged.

Few to Absent: — **Chert**: eq and el. sr-wr coarse sand sized to 2.5mm granules, mode 1.8mm. Equigranular, clear to brown-straw in ppl (x40), iron stained in ELAJ44 and ELAJ44.

Quartz: polycrystalline, eq and el, sr-wr, medium sand sized to granuals <2.5mm, mode 1.0mm, inequigranular, undulose extinction, sutured grain boundaries with grains ranging tom from 0.02mm to

	1.05mm. Commonly these grains can be seen to contain vacuoles, both randomly and linearly arranged.
Rare to Absent:	**Ironstone**; eq and el, sr to sa <0.8mm, mode 0.5mm. Rarely do they contain fine sand to silt sized quartz and feldspar grains (ELAJ44).
Very Rare to Absent:	**Siltstone**; eq, r < 1.25mm (ELAJ44), composed of sa coarse silt to fine sand sand and silt sized muscovite in an opaque ferruginous cement Limestone fragments: <1.0mm, sr-sa, extremely ferruginous limestone containing composed of rhombic calcite crystals within a micritic cement also sa iron opaques <0.1mm (ELAJ117) **Calcareous sandstone**: sa <0.6mm mode 0.4mm, comprising poorly sorted grains sa-r quarts and very rarely polycrystalline quarts in a calcite cemented matrix (ELAJ44). **Sandstone**: sa-a <1.5mm fragments of coarse grained sandstone (ELAJ118, ELAJ30, ELAJ92) with kalonite cement. Quartz showing undulose extinction and traversed by lines of vacuoles. Fine sand sized muscovite laths seen in matrix of ELAJ118. **Feldspar**: microcline and plagioclase sa-sr <0.5mm, mode 0.3mm, weathered.

Fine Fraction

Common to rare	**Oolitic Ironstone**: ooliths and pisoids eq and el, < 0.65mm, mode 0.4mm; laminated structure visible in PPL (x40) in ELAJ43, where voids have developed between concentric layers and where outer layers have flaked way. **Opaques**: ironstone fine sand to silt sized, eq and el, sa-sr. **Clacite**: eq and el, a-sr <0.5mm, mode 0.15mm (ELAJ44)
Few	**Quartz**: Silt sized grains sa **Glauconite***:* el sa-wr <0.5mm, mode 0.2mm ranging in colour from green to deep red brown due to iron staining.
Rare to absent	**Amphibole***:* r single grain 0.14mm (ELAJ18) **Muscovite***:* silt sized laths

III Textural concentration features:

a) Tcf%:

b) Note: Reddish brown in PPL (x40) high to neutral optical density, rounded to sub rounded, eq, sharp to merging boundaries, composed of optically active clay with silt sized sq quartz grains, fine silt sized iron opaques are also evident (ELAJ043).
Dark brown in XP(x40) and blown black in PPL. Sharp boundaries, a – sr, high optical density. El, tabular shape. Comprising rare silt sized quartz, rare opaque iron sr 0.1mm, rare macro channels, very rare to absent silt sized muscovite laths. Voids and muscovite showing parallel orientation. Suggest that this is a grog fragment.

IV 'Amorphous' concentration (depletion) features (including opaques):

a) Acf%:

b) Note:

Comments

This is a heterogeneous group characterised opaque ooliths, deriving from an oolitic ironstone. The potters producing this fabric either added a well rounded quartz sand temper a glacially derived sand temper. Vessels were formed by coiling – that is by joining successive rings, or coils of clay, one on top of the other. This is demonstrated by sample ELAJ042 in which a void running diagonally from edge of section to centre idnetifes the point at which two coils were joined. The optical activity of the groundmass in these samples demonstrates that the potters were not firing their vessels to very high temperatures, certainly no higher than c.850^{o}C, and the presence of carbonised organic material in voids demonstrates that the vessels were not fired for a sufficient time to allow the organic material to fully burn out (see Reedy 2008, 185-6; Tite 1995; Hodges 1963).

The lithology present in these samples – fragments of limestone, calcareous sandstone, sandstone with kaolinite cement (probably the Carboniferous Millstone Grit Sandstone of the Pennines – see Vince 2004, 6-9; Vince 2003a, 9-10), weathered microcline and plagioclase feldspars and glauconite – accords with that of oolitic ironstone rich pottery that was excavated from Skendleby (Lincolnshire) (Vince 2007b). All inclusions seen in the Skendleby samples, and those in the present study can be sourced in the solid and drift geology of the Lincolnshire Wolds. For example, the Tealby Formation overlays the Claxby Ironstone, which in turn overlays the Cretaceous Spilsby Sandstone; all crop out along the Wolds' edge. The Claxby Ironstone is a muddy oolitic ironstone, containing goethite ooliths and glauconite. Goethite ooliths and glauconite are also present in the ferruginous Tealby Formation, which contains the Tealby Limestone, and finally the Spilsby Sandstone comprises poorly sorted medium sand to very coarse to granular sub-angular to rounded quartz, chert and rarely medium sand sized microcline feldspar and polycrystalline quartz (Gaunt *et al.* 1992).

The weathered feldspars and the coarse grained sandstone with kaolinite cement can be identified in glacial deposits on, and at the foot of, the western facing scarp of the Wolds (see Figure 5.19 for the location of glacial deposits). Here, glacial deposits of sand, gravel and clay contain a range of far-travelled erratics, including igneous rocks from south-western Scotland and the Pennines (see CHARN fabrics below for further details) and the Carboniferous sandstones from the Pennines (Ixer and Vince 2009, 12; Wilson 1971, 72, 78-80; Gaunt *et al.* 1992, 120-1, Vince 2007b, 4).

As noted, the oolitic iron ore is likely to be the Claxby Iron Stone. This muddy oolitic ironstone has few natural exposures, but it forms reddish brown clayey soils with shiny ooliths in the plough-land. The northern most occurrence being just north-east of Audleby (c.12km south of Elsham) (Gaunt et al 1992, 71-3). Given the clays that develop from the weathering of the ironstone, it is probable that the ooliths were present in the parent clay and that the coarse well rounded quartz and fragments of sandstone were added to the clay as temper.

Related Sections

Fabric Group Name: **Two Mica Granite Group**

Samples: MT047, MT048, MT050, MT051, MT056, MT065, MT086, MT177, GP037, GP031, GP072, ELAJ070.

Sub Groups: Main Group: MT048, MT050, MT065, GP037, GP072, ELAJ070.
Sub Fabrics A: MT051, MT177.
Sub Fabric B: MT056, MT086, GP031.
Sub Fabric C: MT047.

Cemetery-cemetery
Cemetery-settlement

I Microstructure:

a) Voids — Predominantly meso-channels and rarely mega vughs. Mega vughs contain burnt organic matter. Voids largely a result of shrinkage in the clay when drying.

b) C/f related distribution — Closed to open spaced

c) Preferred orientation — Poorly developed in samples MT47 and MT48 with voids weakly aligned with vessel walls.

II Groundmass:

a) Homogeneity

b) Micromass (material less than 0.01mm) **c70%**

(i) Optical state — Slightly optically active

(ii) birefringent fabric — Striated b-fabric

(iii) colour

x40 in ppl: Red brown to brown and pale red straw
x40 in xp: Pale orange brown to dark red brown

c) Inclusions:

i) c:f ratios

$c:f:v_{0.01mm}$ c. 20:75:5 to c. 70:20:10
Coarse Fraction Medium sand to very coarse sand (0.35mm to 1.25mm)
Fine Fraction Fine sand and below (<0.35mm)

ii) texture

iii) composition

Coarse Fraction

Frequent: **Quartz**: sa-sr, eq and el. <0.5, mode 0.4mm. Mono-crystalline with undulose extinction.

Common: **Plutonic igneous rock**: eq and el. sa-sr <1.25mm, mode 0.8mm. Comprising fine to coarse grained quartz, orthoclase and microcline feldspars, muscovite mica and rarely perthite. Few fragments are seen to contain plagioclase altering to fine grained sericite and clay minerals.
Feldspar: orthoclase sa-sr, eq and el. <0.5, mode 0.4mm.

Few to Very Few: **Feldspar**: microcline sa-sr, eq and el. <0.5, mode 0.4mm.
Feldspar: plagioclase sa-sr, eq and el. <0.5, mode 0.4mm.
Muscovite Mica: el laths <1.0mm, mode 0.7mm.

Rare: **Biotite**: el laths <1.0mm, mode 0.7mm.

Very Rare to Absent:	**Sandstone**: Coarse grained sa-sr fragments, < 1.0mm, mode 0.8mm. Composed of quartz with overgrown grain boundaries within a kaolinite cement. **Quartz-feldspar intergrowth with micrographic texture:** (single fragment in MT065) 0.4mm, sa, eq.

Fine Fraction

Predominant to Common:	**Quartz**: <0.25mm a-sr, mode 0.03mm
Common:	**Feldspars**: <0.25 a-sr, mode 0.03mm
Few to rare:	**Muscovite**: silt sized laths few in sample MT065, rare in MT088. **Opaques**: silt size ferruginous opaques

III Textural concentration features:
a) Tcf%:
b) Note:

Comments

This is an homogenous group, characterised by a two mica granite that, in most cases, has been crushed and added as temper to a boulder clay. The potters formed these vessels by coiling – that is by joining successive rings, or coils of clay, one on top of the other. This is demonstrated by samples MT056 in which the preferred orientation reveals a relic coil. The optical activity of the groundmass in these samples demonstrates that the potters were not firing their vessels to very high temperatures, certainly no higher than c.850°C, and the presence of carbonised organic material in voids demonstrates that the vessels were not fired for a sufficient time to allow the organic material to fully burn out (see Reedy 2008, 185-6; Tite 1995; Hodges 1963).

The suit of minerals present in the plutonic igneous rock fragments that characterise this group are characteristic of the Cairnsmore of Fleet granite – 'microcline-bearing, two-mica granite with quartz, plagioclase, potassium feldspar (including coarse grained microcline), biotite and primary, often coarse grained muscovite' (Ixer and Vince 2009, 17). The perthites seen in these samples are not a characteristic of this granite, they are, however, a component of the Criffel-Dalbeattie granodiorite. The course followed by the Pleistocene and Devensian drifts that were deposited in the north of the country readily explain the presence of this suit of minerals and rock types in these samples.

Glacial action in the Pleistocene brought material south from the Cairnsmore of Fleet and Criffefel-Dalbeattie outcrops. These ice sheets passed through the Vale of York, bringing with them other material, such as the Shap granite from the Lake District, and Carboniferous Sandstones. These glacial erratics were carried south, through the Vale and in to the Trent Valley The ices flows formed various blockages in the low lying ground, and melt-waters from these glaciers formed glacial lakes and channels. The various rocks that had been carried by the glaciers were transported by this melt-water into the lakes and river channels. In particular, this formed Lake Humber, which covered the Ancholme Valley and the Vale of York (Ixer and Vince 2009, 12; Wilson 1971, 72, 78-80).

The Cairnsmore of Fleet and Criffel-Dalbeattie material was also carried south-eastwards, through the Tyne gap, where it merged with ice sheets containing material from the Cheviot Hills. This ice moved south, along the east coast of England. Notably, it did not collect material from the Vale of York. The deposits from this Glacier are largely confined the eastern edge of the Lincolnshire Wolds, although a small deposit of till just east of West Halton marks the most westerly advance of this ice sheet (Gaunt et al. 1992, 118). Given the present of Carboniferous Sandstone in these samples, it is likely that the sands, gravels and clays used to prepare the paste of these samples derive from deposits west of the Lincolnshire Wolds.

In agreement, the Chalky Boulder Clay also comprises material from the Shap, Vale of York, the Cheviot Hills and igneous rocks from south western Scotland, is confined to the western side of the Wolds, in the Ancholme Valley (Gaunt *et al.* 1992). Although it is largely concealed by later deposits, there are exposures of till and clay from this pre-Devensian ice movement around Elsham and Melton Gallows. Again this demonstrates that the materials used in the preparation of this clay paste were available locally.

Related Sections
Sub-Fabrics:

Sub Fabric A
Samples MT177, MT051
These samples contain the two mica granite as described by Ixer and Vince (2009), (containing perthite, microcline feldspars, muscovite, biotite, quartz, zoned plagioclase, biotite and magnetite) but in these samples the material is very angular and poorly sorted, ranging from single disaggregated grains of fine sand size through to 1.75mm. These grains have been crushed or fire cracked and added to the clay as temper.

Sub Fabric B
MT056, MT086, GP031
Samples contains fine to coarse sa-sr plutonic igneous material comprising muscovite, plagioclase, quartz and perthite and microcline feldspar. Hexagonal crystals of garnet were also noted in the granitic clasts in GP031. It is separable from the main group, however, by the inclusion of lithic fragments composed of medium grained quartz in a calcite matrix. A single sr eq 0.5mm grain of radiolarian chert is also present in MT086. Such inclusions were not noted in any of the other samples. The Ancholme Valley till contains the Elsham sandstone (see Calcareous Sandstone Group) along with the other erratics noted above (Gaunt *et al.* 1992)

Sub Fabric C
MT047
Again this sample comprised the suit of minerals noted in the main group, but in this instance the silt sized fraction is all but absent from the matrix. The matrix is characterised by medium sand sized amorphous concentration features which appear orange brown in both ppl and xp (x40). The sample contains a single 4.5mm well rounded grain of siltstone, comprising well sorted silt sized grains of quartz and muscovite mica within a ferruginous cement. The sample also contains a fragment of a myrmetikitic quartz-plagioclase intergrowth and granophphyric quartz-feldspar intergrowths.

Fabric Group Name:	**Very Coarse Grained Well Rounded Quartz and Chert**
Samples:	ELAJ010, ELAJ011, ELAJ013, ELAJ15, ELAJ16, ELAJ017, ELAJ018, ELAJ023, ELAJ108, ELAJ114, ELAJ115, ELAJ116, ELAJ119, ELAJ120, ELAJ125, GP020, GP039, GP040, GP087, GP093, MT012, MT069,
Sub Groups:	Main Group: ELAJ010, ELAJ011, ELAJ013, ELAJ017, ELAJ018, ELAJ023, ELAJ108, ELAJ116, ELAJ119, ELAJ125, GP039, GP040, GP087, GP093, MT012, MT069. Sub Group A: ELAJ015, ELAJ016, ELAJ114 Sub Group B: ELAJ115, ELAJ120, GP020 Sub Group C: ELAJ026, ELAJ036, ELAJ049, ELAJ105,
Cemetery-cemetery	ELAJ010=MT012=MT016
Cemetery-settlement	GP39=GP40=ELAJ013=ELAJ116; GP87=ELAJ018 GP093 = ELAJ116

I Microstructure:

a) Voids	Predominantly macro- and mega-planar voids and channels. Rare to absent mega vughs (containing burnt out organics – ELAJ010).
b) C/f related distribution	Open spaced
c) Preferred orientation	Aligned parallel to vessel walls

II Groundmass:

a) Homogeneity	Homogeneous group characterised by very coarse well rounded quartz and chert added to the clay as temper.

b) Micromass (material less than 0.01mm)

(i) Optical state	Highly optically active to slightly optically active
(ii) birefringent fabric	Thick random striated to granostriated b-fabric

(iii) colour

x40 in ppl:	Grey-brown to brown-black (ELAJ114)
x40 in xp:	Golden brown to dark orange brown and brown-black

c) Inclusions:

i) c:f ratios

c:f:v $_{0.01}$	c. 93:5:2 to c. 88:10:2
Coarse Fraction:	Medium sand to granules (0.25mm to 2.7mm)
Fine Faction:	Fine sand and below (0.25mm and below)

ii) texture

iii) composition

Coarse Fraction

Frequent to Common:	**Quartz**: moncrystalline, eq and el, sr-wr, medium sand sized to granules <2.5mm, mode 1.0mm, frequently with undulose extinction and with vacuoles both randomly and linearly arranged. Commonly traversed by micro-cracks, some of which are iron stained. Very rarely do they contain zircon crystals (ELAJ11, GP087).
Common:	**Chert**: eq and el. sr-wr coarse sand sized to 2.5mm granules, mode 1.8mm. Equigranular, clear to brown-straw in ppl (x40), iron stained in ELAJ101 and GP087; chalcedonic in ELAJ017, GP039, GP087, **Quartz**: polycrystalline, eq and el, sr-wr, medium sand sized to granuals <2.5mm, mode 1.0mm, inequigranular, undulose extinction, sutured grain boundaries with grains ranging tom from 0.02mm to 1.05mm. Commonly these grains can be seen to contain vacuoles, both randomly and linearly arranged. Very rarely to absently do they

contain zircon (ELAJ116).

Very Rare to Absent: **Opaques***:* well rounded grains, probably goethite ooliths and pisoids 0.3mm to 0.6mm (ELAJ116, GP039, GP40, ELAJ13, ELAJ18, GP087). Silt sized quartz nucleus in ELAJ013.

Orthoclase Feldspars: Weathered fine sand sized sa-sr eq < 0.8mm (ELAJ11, GP87,)

Microcline Feldspar: eq, sr-r, <0.8mm, mode 0.4mm weathered altering to clay along cleavage plains, altering to white mica (ELAJ125).

Glauconite: eq, r <0.4mm

Sandstone: feldspathic greywacke eq, sr <2.0mm, composed of medium sand sized quartz and weathered plagioclase. Slightly metamorphosed – sutured grain boundaries (ELAJ23 and ELAJ119).

Clacite*: sa ,eq* <0.4mm mode*,* 0.3mm (ELAJ125)

Calcareous sandstone: eq and el, sr- sa, medium quartz sand with fine to medium grained calcite cement.

Opaques: eq and el, sr-sa, 0.2 to 0.75, mode 0.4mm

Fine Fraction

Predominant to common **Quartz***:* sa-sr, fine sand to silt sized grains

Few to rare **Opaques***:* sa-sr, fine sand to silt sized grains

Rare **Muscovite:** silt sized grains

Very rare to absent **Amphibole**: Straw born in XP (x40)

Calcite: sa ,eq, euherdal crystals (ELAJ11)

Plagioclase feldspars: silt sized

III Textural concentration features:

a) Tcf%: <2% (of total field)

b) Note: Reddish brown to dark brown-black in ppl (x40), rounded to sub rounded, eq and el, high optical density, sharp to diffuse boundaries, merging in ELAJ114, containing same silt sized fraction which constitutes the fine fraction.

Comments

This is an homogenous group, characterised by very coarse to granular sand (with grains upto 2.5mm), composed of water polished quartz, chert, and chalcedony, that has been added as temper to a boulder clay. The potters formed these vessels by coiling – that is by joining successive rings, or coils of clay, one on top of the other. This is demonstrated by samples ELAJ023 and ELAJ108 in which the shrinkage of the clay when drying has pulled the coil join apart leaving diagonal voids running through the vessel wall, indicating the location of the coil join. The optical activity of the groundmass in these samples demonstrates that the potters were not firing their vessels to very high temperatures, probably in the region of 550-750^{o}C and certainly no higher than c.850^{0}C, and the presence of carbonised organic material in voids demonstrates that the vessels were not fired for a sufficient time to allow the organic material to fully burn out (Reedy 2008, 185-6; Tite 1995; Hodges 1963).

The composition of this sand is identical to the range of inclusions seen in the *Calcareous Sandstone with Coarse Grained WRQ and Chert Group*. It is likely, then, that the sand is the decalcified detritus from the Spilsby Sandstone. This is supported by the rarely occurring goethite ooliths and pisoids, found in both groups, and the rare calcite in few of these samples (e.g. ELAJ125). The ooliths are characteristic of the Claxby Ironstone, which, significantly, overlays the Spilsby Sandstone. As the majority of samples in this group derive from sites close to these outcrops, the archaeology is in accordancde with the geology.

A second coarse well-rounded quartz and chert group was identified in the assemblage from the cemetery of Cleatham – the Cleatham Well Rounded Quartz and Chert group. This group is separable from the Cleatham group, however, on account of the grain size and the presence of goethite ooliths and glauconite. The ooliths and glauconite were absent from the Cleatham group, whilst the largest quartz grains in the Cleatham group were 1.5mm, whereas in the Elsham group the grains were frequently in the region of c.2.5mm; the modal grain size of Cleatham Group is also considerably smaller this Elsham group. Notably, samples in the Cleatham samples also contain fragments of plutonic igneous rock fragments and coarse grained kaolinite cemented sandstone – both of which are absent in samples belonging to the current group.

Related Groups

Sub Fabric A:

ELAJ015, ELAJ016, ELAJ114

This group is separable form the main group on account of the fine faction. The clay in these samples contains much quartz and silt sand. Indeed, the silt sized fraction dominates the clay.

Sub Group B:

ELAJ115, ELAJ120, GP020

This group of samples is separable from the main group on account of the presence of igneous rock clasts. Indeed, these sample contain igneous clasts composed of muscovite, plagioclase altering to sericite, and biotite. These clasts are of the same composition as those noted in the Two Mica Granite Group. Their presence suggests, like the main group, that a boulder clay was used in the preparation of the clay paste. The source of this boulder clay is likely to have been different to that of the main group.

Sub Group C:

ELAJ026, ELAJ036, ELAJ049, ELAJ105,

The range of lithologies of the coarse fraction in these samples is the same as the main group; in this instance they consist slightly less, with the remained being made up of calcareous clasts, comprising chalk, limestone containing micritic peloids. Again the clay is a boulderclay, this is indicated by the presence of igneous clasts in samples ELAJ026 and ELAJ036 – similar to those in Sub Fabric B – and well rounded grains of very weathered basalt(?) in the fine fraction of sample ELAJ04.